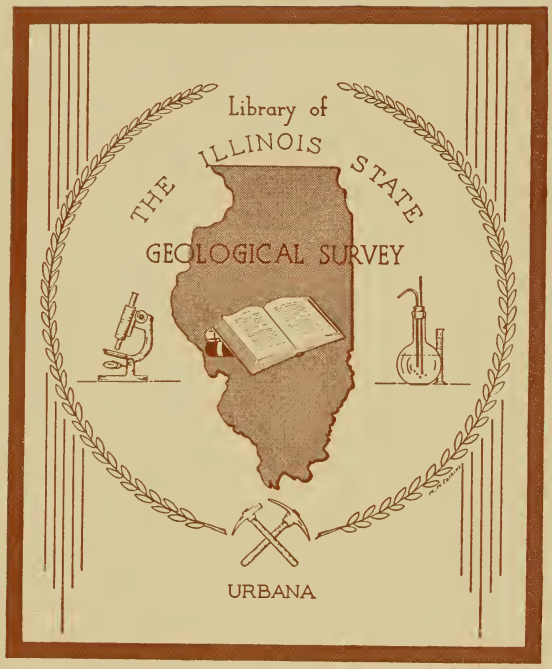
Illinois
State Geological Survey



STATE OF ILLINOIS

STATE GEOLOGICAL SURVEY

FRANK W. DEWOLF, Director

BULLETIN No. 30

BIENNIAL REPORT FOR 1913 AND 1914

ADMINISTRATIVE REPORT

AND

ECONOMIC AND GEOLOGICAL PAPERS

Certain papers in cooperation with U. S. Geological Survey

PRINTED BY AUTHORITY OF THE STATE OF ILLINOIS

ILLINOIS STATE GEOLOGICAL SURVEY
UNIVERSITY OF ILLINOIS
URBANA
1917


REVIEW
PRESS
PEORIA ILL.

STATE GEOLOGICAL COMMISSION

FRANK O. LOWDEN, *Chairman*
Governor of Illinois

THOMAS C. CHAMBERLIN, *Vice-Chairman*

EDMUND J. JAMES, *Secretary*
President of the University of Illinois

FRANK W. DEWOLF, *Director*
FRED H. KAY, *Asst. State Geologist*

LETTER OF TRANSMITTAL

State Geological Survey
University of Illinois, March 10, 1917.

Governor Frank O. Lowden, Chairman, and Members of the Geological Commission.

Gentlemen: I submit herewith my administrative report for the biennium ended June 30, 1915, and recommend that with the accompanying papers it be published as Bulletin No. 30.

The financial statements have previously been submitted to the Commission for approval, but are offered now as a public record. Parts of the accompanying papers have previously been printed as extracts, but for the most part have been held until now on account of congestion in printing.

Several of the papers have been prepared by geologists of the U. S. Geological Survey, in cooperation with the State of Illinois, and the advantages of this arrangement are pointed out under the administrative report.

Very respectfully,

Frank W. DeWolf, *Director.*

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By F. W. DeWolf, Director

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GENERAL STATEMENT

During the period from July 1, 1913, to June 30, 1915, the work of the Geological Survey followed much the same channels as in previous years. Besides the regular topographic mapping, a large amount of field work was completed on general stratigraphy, coal, oil, and clay resources, and in the mapping of overflowed lands. Plans included a special investigation of aggregate materials and a survey of the economic resources of the upper Illinois Valley, but funds were not adequate to carry on these investigations.

ORGANIZATION AND PERSONNEL

The Survey maintained the same general organization as before. Cooperation was continued with the U. S. Bureau of Mines and the U. S. Geological Survey. F. W. DeWolf, Director, and F. H. Kay, Assistant Director, continued in charge of the geologic section. The topographic section was administered by R. B. Marshall, Chief Geographer, U. S. Geological Survey, and W. H. Herron, Geographer in charge Central Division.

Professors Salisbury, Grant, and Barrows remained as consulting geologists, and Professors Parr and Bartow as consulting chemists. A. V. Bleininger, Ceramist, was in general charge of clay studies.

R. S. Blatchley was granted leave of absence for one year to undertake oil investigations in Turkey. After his return he resigned to enter private consulting practice. K. D. White resigned also to accept a position in the commercial field.

Fred H. Kay has taken charge of the oil investigations and will conclude his work on Illinois coal resources. G. H. Cady has arranged to give full-time services to the Survey instead of part time as heretofore.

Miss Blanche Fowler resigned as stenographer August 1, 1914, and Miss Faith Neighbour was appointed to fill the vacancy.

The organization of the Survey, including a large number of part-time men, was as follows:

COMMISSIONERS

Governor E. F. Dunne, Chairman
Professor T. C. Chamberlin, Vice-Chairman
President E. J. James, Secretary

ADMINISTRATIVE WORK

F. W. DeWolf, Director
Fred H. Kay, Assistant State Geologist
C. H. Thory, Chief Clerk

GEOLOGICAL SECTION

F. W. DeWolf, Geologist
R. D. Salisbury, Consulting Geologist
U. S. Grant, Consulting Geologist
Harlan H. Barrows, Consulting Geologist
S. W. Parr, Consulting Chemist
Edward Bartow, Consulting Chemist
F. H. Whittum, Chemist
H. J. Weiland, Assistant Chemist
Stuart Weller, Geologist
T. E. Savage, Geologist
Fred H. Kay, Geologist
G. H. Cady, Geologist
J. A. Udden, Geologist
L. E. Young, Mining Engineer

R. S. Blatchley, Assistant Geologist
C. B. Anderson, Assistant Geologist
J. L. Rich, Assistant Geologist
W. C. Morse, Assistant Geologist
F. M. Van Tuyl, Assistant Geologist
Helen Skewes, Assistant Geologist
Wallace Lee, Assistant Geologist*
H. M. DuBois, Assistant Geologist
Bertha Thornburg, Assistant Geologist
L. E. Kennedy, Assistant Geologist
A. V. Bleininger, Ceramist
R. T. Stull, Ceramist
J. M. Lindgren, Chemist
D. F. McFarland, Chemist
W. S. Nelson, Engineering Draftsman
M. L. Nebel, Draftsman
L. S. Baldwin, Draftsman
Blanche Fowler, Clerk
Faith Neighbour, Clerk
H. P. Ousley, Field Assistant
C. W. Clark, Field Assistant
L. W. Swett, Field Assistant
R. W. Brown, Field Assistant
Paul Morse, Field Assistant
J. H. Bell, Field Assistant
H. R. Moore, Field Assistant
E. H. Pool, Field Assistant
D. E. Day, Levelman
J. P. Pepper, Levelman
J. D. Mattison, Levelman
Harry Almond, Field Cook
O. F. Brooks, Office Assistant
S. T. Wallage, Office Assistant
E. F. Rehnquist, Office Assistant
G. C. Vanden Boom, Office Assistant
W. C. Vander Mark, Office Assistant

Geological Section

General stratigraphy

Field work and reports were completed by Stuart Weller covering the general geology of the Illinois area of the following quadrangles: Baldwin, Kimmswick, Chester, Crystal City, and Renault. The Mahomet, Urbana, and Avon surveys were completed by T. E. Savage. J. A. Udden completed the Milan quadrangle. The Coulterville quadrangle was practically finished by Mr. Cady, who has prepared a report for combination with a similar report on the area immediately west.

*Assigned by U. S. Geological Survey to work in cooperation.

COAL INVESTIGATIONS

The investigation in cooperation with the University and the U. S. Bureau of Mines was carried on according to agreement. Unfortunately the funds did not permit all of the work that could have been done to advantage. The collection of diamond-drill records and the determination of their levels was continued; the results are now being incorporated into maps which will be issued later. Eighty-five samples of promising clay materials, occurring in connection with coal, were collected by the Survey and submitted to the Ceramics Department of the University for laboratory tests, according to an agreement. Reports on the various coal fields by Mr. Kay are in progress. Professor Parr is preparing a report on the coal analyses completed in 1912 and another one on the status of the coke industry as affecting Illinois coal. The preliminary publication of the analyses has been issued as an extract from Bulletin 3. Reports on the coal resources of the Belleville and of the Danville districts were submitted in 1914. A preliminary investigation of surface subsidence due to mining was completed by Mr. Young. The report will be extended to a study of foreign experience and practices, under direction of the Mining Department of the University.

OIL AND GAS INVESTIGATIONS

Studies in the oil fields were deferred until 1914 on account of the need of finishing up reports already in press and in preparation. Bulletin 22, on the oil fields of Crawford and Lawrence counties, was issued in 1914. A report on oil and gas in Bond, Montgomery, and Macoupin counties was issued during the summer of 1914.

Geological field work for the purpose of locating favorable oil structure in advance of topographic mapping was completed for the area directly south of the new Plymouth oil field by Messrs. Morse and Rich and a corps of levelmen and rodmen. A report on the Allendale field was prepared by Mr. Rich for publication in Bulletin 31.

During the biennium the Geological Survey, in cooperation with the U. S. Geological Survey, was successful in locating the Colmar oil field, McDonough County; the Staunton gas field, Macoupin County; and the Spanish Needle Creek field, Macoupin County.

CLAY RESOURCES

In connection with the Mining Investigations, 85 samples of promising clay materials were collected in coal mines throughout the State and submitted to the Department of Ceramic Engineering, University of Illinois, for laboratory tests. This is a new line of investigation for the State, and it will probably produce valuable results. The report on this work will be sent to press as soon as the laboratory tests are made by the Ceramics Department.

OVERFLOWED LANDS

Careful investigations of areas possibly deserving reclamation surveys were made by the Director, a drainage engineer on behalf of the State, and a representative of the U. S. Geological Survey. The examination included Saline River, in Saline and Gallatin counties; Crooked Creek, in Schuyler and McDonough counties; and McGees Creek, in Adams, Brown, and Pike counties. There is much land to be reclaimed along each of these streams, but in the absence of strong local sentiment favoring reclamation projects, it seemed unlikely that investigational work would be utilized for many years. It was agreed unanimously that surveys were hardly warranted at this time.

An informal conference was held with the chairman and the engineer of the Rivers and Lakes Commission to consider whether that Commission would prepare an engineering report based on our maps of the Spoon River Valley, and also complete a report for the Big Muddy Valley, according to our agreement with the previous Rivers and Lakes Commission. Informally the Commission has agreed to go on with the reclamation studies as rapidly as funds will permit. Unfortunately it was found later that the Rivers and Lakes Commission could not carry on this work, and the Geological Commission engaged at its own expense Melluish and Broyhill of Bloomington to make an engineering report on the Spoon River Valley reclamation. The work was later turned over to the Harman Engineering Company, who completed the report for publication as Bulletin 32.

The Survey published an edition of all topographic maps previously made of lands subject to overflow.

BUREAU OF INFORMATION

The Survey maintains a bureau of information for the convenience of inquirers about mineral resources of Illinois. Requests are received in great numbers both from inside and outside the State. When possible, a bulletin containing the desired information is mailed. Frequently, however, it is necessary to make special study and to reply by letter at some length. Many requests for the identification of minerals are received and answered promptly; others for chemical analysis of specimens are, for the most part, necessarily refused. It has been found that the collection of a representative sample of a material and the investigation of its favorable occurrence for development are quite as essential and require expert advice, just as does chemical analysis. As a rule, therefore, unless a representative of the Survey investigates and samples a mineral deposit, an analysis at public expense is not justified, particularly because otherwise Survey funds would be seriously depleted by work which frequently is of no permanent value. Preliminary examinations and opinions as to probable value of minerals are always cheerfully given.

TOPOGRAPHIC SECTION

JULY 1, 1913, TO JUNE 30, 1914

The Commission allotted $10,000 for the continuation of cooperative topographic surveys in Illinois, and an additional $1,500 from a fund advanced by private persons for the mapping of the Gallatin County portions of the Equality and Shawneetown quadrangles, and the United States Geological Survey allotted $11,500 to meet these amounts.

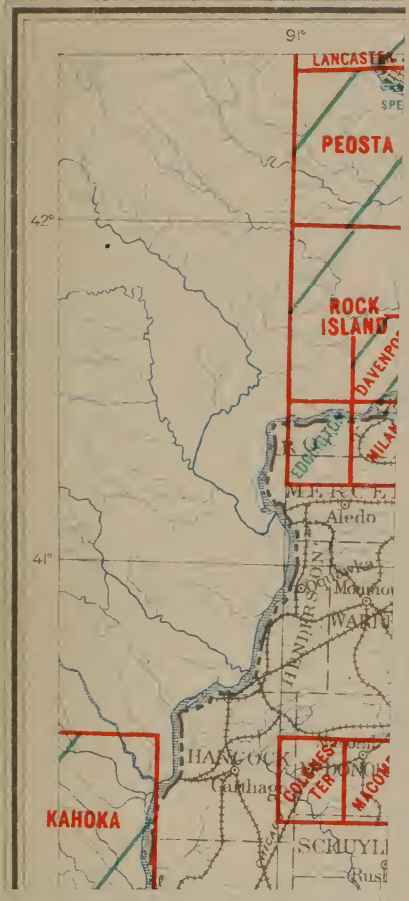
The survey of the Mount Olive and Avon quadrangles and the Illinois portion of the Edgington quadrangle, in Macoupin, Montgomery, Fulton, Knox, McDonough, Warren, Mercer, and Rock Island counties, was completed, and that of the Sparta quadrangle, in Perry, Randolph, St. Clair, and Washington counties, was commenced by Frank Tweedy, W. L. Miller, Fred Graff, jr., Gilbert Young, L. L. Lee, and W. S. Gehres, the area mapped being 794 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. The survey of the Iowa portion of the Edgington quadrangle, in Muscatine and Scott counties, was completed by Frank Tweedy, the area mapped being 52 square miles, for publication on the same scale as the Illinois portion, all expenses being borne by the Federal Survey. The mapping of the Equality quadrangle and of the Illinois portion of the Shawneetown quadrangle was continued by O. H. Nelson, E. L. Hain, J. A. Duck, and F. B. Barrett, the area mapped being 90 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. The resurvey of the Marseilles quadrangle, in Grundy, Kendall, and La Salle counties, was completed, and that of the Morris quadrangle, in Grundy and Kendall counties, was commenced by L. L. Lee, the area mapped being 232 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet.

For the control of these areas and of the Brownfield quadrangle, in Johnson, Massac, and Pope counties, W. S. Gehres, C. R. French, G. W. Lucas, R. G. Clinite, and S. R. Archer ran 413 miles of primary levels and established 111 permanent bench marks, 21 miles of levels and 5 bench marks being in Iowa. For the control of the Birds, Equality, Brownfield, Marion, Stonefort, Vienna, Merom, Oaktown, and Vincennes (Ill.-Ind.) quadrangles and the Illinois portion of the Golconda and Paducah quadrangles, in Crawford, Lawrence, Gallatin, Pope, Hardin, Saline, Johnson, Massac, Williamson, Pulaski, and Clark counties, Ill., and Knox and Sullivan counties, Ind., C. B. Kendall ran 217 miles of primary traverse and set 15 permanent marks, 33 miles and 2 marks being in Indiana.

JULY 1, 1914, TO JUNE 30, 1915

The Commission allotted $9,000 for the continuation of cooperative topographic surveys in Illinois and the United States Geological Survey allotted an equal amount.

U S GEOLOGICAL SURVEY
GEORGE OTIS SMITH
DIRECTOR



The survey of the Coulterville and Equality quadrangles and of the Illinois portions of the Shawneetown, Birds, Fords Ferry, and Golconda quadrangles in Perry, Randolph, St. Clair, Washington, Gallatin, Hardin, Pope, Saline, Crawford, and Lawrence counties was completed, and that of the Brownfield quadrangle, in Johnson, Massac, and Pope counties, was begun by C. W. Goodlove, Fred Graff, jr., Gilbert Young, J. A. Duck, R. G. Clinite, R. M. Herrington, and W. S. Gehres, the total area mapped being 539 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet.

For the control of the Brownfield, Morris, Birds, Good Hope, Paducah, Woodhull, Quincy, Orion, Alexis, Augusta, Monmouth, Meredosia, La Harpe, Mount Sterling, Camp Point, Griggsville, Pittsfield, and Barry quadrangles, in Johnson, Massac, Pope, Grundy, Kendall, Crawford, Lawrence, McDonough, Warren, Henry, Knox, Mercer, Adams, Pike, Rock Island, Brown, Schuyler, Hancock, Cass, Fulton, Henderson, Morgan, Scott, and Greene counties, S. R. Archer, E. C. Bibbee, G. W. Lucas, and R. G. Clinite ran 461 miles of primary levels and established 135 permanent bench marks.

For the control of the Augusta, Beardstown, Good Hope, Lomax, Oquaka, Monmouth, Meredosia, La Harpe, Rushville, Kirkland, Wilmington, Sycamore, Shabbona, Quincy, Mount Sterling, Morris, Liberty, Earlville, Dwight, Camp Point, and Yorkville quadrangles, in Adams, Brown, Schuyler, Hancock, Cass, Fulton, McDonough, Warren, Henderson, Pike, Scott, Morgan, Ogle, Dekalb, Boone, Winnebago, Will, Kankakee, Kane, Lee, Grundy, Kendall, La Salle, and Livingston counties, E. L. McNair ran 373 miles of primary traverse and set 31 permanent marks.

Publications

Reports

Owing to the congestion of printing under State contract many manuscripts accumulated in the Geological Survey office. In the winter of 1914, however, a special appropriation for printing was made to the State Geological Survey, with the expectation that during the coming biennium all reports will be printed up to date. During the present biennium the following bulletins were issued:

Bulletin 21: Lead and zinc deposits of northwestern Illinois, by G. H. Cox.

Bulletin 22: Oil in Crawford and Lawrence counties, by R. S. Blatchley.

Extract from Bulletin 23: The Alexandrian series, by T. E. Savage.

Bulletin 24: Deep borings in Illinois, by J. A. Udden.

Bulletin 25: Report and plans for reclamation of land subject to overflow in the Embarrass River valley, by Harman Engineering Company.

Bulletin 28: Gas and oil in Bond, Macoupin, and Montgomery counties, by R. S. Blatchley.

Bulletin 29: Purchase and sale of Illinois coal under specifications, by S. W. Parr.

TABLE 1.—*Progress of field work by topographic section, July 1, 1913 to June 30, 1915*

Quadrangles	Counties	Publication scale	Area mapped	Levels		Traverse		
				Primary	Perm. B. M.'s	Primary	Perm. marks	Second'y
1913			*Sq. Mi.*	*Miles*		*Miles*		*Miles*
Mt. Olive	Macoupin, Bond, Montgomery	1:62,500	232	----	----	----	----	948
Avon	Fulton, Knox, Warren, McDonough	1:62,500	217	64	13	----	----	551
Edgington	Mercer, Rock Island	1:62,500	172	43	12	----	----	342
Equality	Gallatin, Pope, Hardin, Saline	1:62,500	14	27	6	18	----	----
Shawneetown	Gallatin, Hardin	1:62,500	76	30	7	----	----	----
Marseilles	Grundy, Kendall, La Salle	1:62,500	224	71	21	----	----	469
Sparta (Coulterville)	Perry, Washington, St. Clair, Randolph	1:62,500	173	78	24	----	----	897
Morris	Grundy, Kendall	1:62,500	8	----	----	----	----	42
Brownfield	Johnson, Massac, Pope	--------	----	63	18	57	3	----
Birds	Crawford, Lawrence	--------	----	15	5	29	3	----
Golconda	Pope, Hardin	--------	----	----	----	23	3	----
Marion	Johnson, Williamson	--------	----	----	----	5	1	----
Stonefort	Johnson, Pope, Saline	--------	----	----	----	22	1	----
Vienna	Johnson, Massac, Pulaski	--------	----	----	----	11	1	----
Merom	Clark, Crawford	--------	----	----	----	5	----	----
Paducah	Massac, Pope	--------	----	----	----	8	1	----
Vincennes	Lawrence, Wabash	--------	----	----	----	6	----	----
	Totals		1116	391	106	184	13	3249
1914								
Coulterville	Perry, Washington, St. Clair, Randolph	1:62,500	62	----	----	----	----	244
Shawneetown	Gallatin, Hardin	1:62,500	17	----	----	----	----	130
Equality	Hardin, Gallatin, Pope, Saline	1:62,500	113	----	----	----	----	267
Birds	Crawford, Lawrence	1:62,500	185	38	11	----	----	----
Fords Ferry	Hardin	1:62,500	22	----	----	----	----	115
Golconda	Hardin, Pope	1:62,500	77	----	----	----	----	397
Brownfield	Johnson, Massac, Pope	1:62,500	63	47	12	----	----	172
Morris	Grundy, Kendall		----	68	20	34	2	----
Griggsville	Greene, Pike, Scott		----	12	3	----	----	----

Pittsfield	Pike	----	22	7	----	----	----
Barry	Pike	----	20	6	----	----	----
Woodhull	Henry, Knox, Mercer, Warren	----	15	4	----	----	----
Quincy	Adams, Pike	----	29	8	10	----	----
Orion	Henry, Mercer, Rock Island	----	18	5	----	----	----
Alexis	Mercer, Warren	----	9	3	----	----	----
Paducah	Massac, Pope	----	10	2	----	----	----
Vienna	Johnson, Massac, Pulaski	----	----	3	----	----	----
Augusta	Adams, Brown, Schuyler, Hancock	----	7	2	32	2	----
Beardstown	Cass, Fulton, Schuyler	----	----	----	11	1	----
Goodhope	McDonough, Warren	----	55	16	32	2	----
Lomax	Hancock, Henderson	----	----	----	12	1	----
Oquawka	Warren, Henderson	----	----	----	8	1	----
Monmouth	Warren	----	20	6	8	1	----
Meredosia	Brown, Pike, Cass, Scott, Morgan, Schuyler	----	18	3	18	1	----
La Harpe	Henderson, Hancock, Warren, McDonough	----	49	17	42	3	----
Rushville	Brown, Schuyler	----	----	----	39	2	----
Kirkland	Ogle, DeKalb, Boone, Winnebago	----	----	----	7	1	----
Wilmington	Will, Kankakee	----	----	----	13	2	----
Sycamore	DeKalb, Kane	----	----	----	7	----	----
Shabbona	DeKalb, Lee, Ogle	----	----	----	38	2	----
Mt. Sterling	Adams, Brown, Pike	----	9	3	10	2	----
Liberty	Adams, Pike	----	----	----	9	1	----
Earlville	DeKalb, Lee, La Salle	----	----	----	8	2	----
Dwight	Grundy, Livingston	----	----	----	7	1	----
Camp Point	Adams, Hancock	----	15	4	22	3	----
Yorkville	Kendall, Kane, Will	----	----	----	6	1	----
	Totals	539	461	135	373	31	1325

The following Illinois Coal Mining Investigations were published:

Extract from Bulletin 3: Chemical study of Illinois coals, by S. W. Parr.
Bulletin 10: Coal resources of District I, by G. H. Cady.
Bulletin 11: Coal resources of District VII, by F. H. Kay.
Bulletin 14: Coal resources of District VIII, by F. H. Kay and K. D. White.

The distribution of these reports so as to prevent waste, and yet make them most widely available, has been in itself a considerable task. It is thought that the interests of all concerned would be best met if 500 copies of each report were reserved for sale at the cost of printing, the receipts from the sales being turned into the State treasury. This makes it possible for libraries to complete their sets and for persons having real need for any of the volumes to obtain the earlier ones at small cost. The remainder of the edition is distributed by the Survey and the Secretary of State to institutions and individuals making application for them, or is exchanged with other Surveys or publishing organizations.

Any of the published reports will be sent upon receipt of the amount noted. Money orders, drafts, and checks should be made payable to F. W. DeWolf, Director.

MAPS

A special edition of 1,000 topographic maps of the Kaskaskia, Embarrass, Big Muddy, and Spoon River valleys was published. A new edition of the Illinois base map, which was first published in 1912, was issued in 1914. Information regarding railroads, elevations, etc., was brought up to date so far as possible.

For a number of years the possibility of publishing topographic maps on the county-unit basis had been contemplated, but until 1914 appropriations would not permit such publication. The map of St. Clair County was issued and proved extremely popular. Other maps on the county basis will follow during the coming biennium.

A special edition of the topographic map of Starved Rock Park was issued. It will later be used as a base for geological and other reports on this area of special interest.

The accompanying illustration (Plate I) shows the areas for which topographic maps have been prepared in cooperation with the U. S. Geological Survey. Those maps published may be obtained from this office by remitting 10 cents for each copy. As the maps do not conform to county lines except as noted above, those desired should be ordered by quadrangle names.

The topographic maps are distributed also from Washington. They may be purchased at the rate of 10 cents each, but when they are ordered in lots of 50 or more copies, the price is 6 cents each. Drafts or money

orders should be sent to the Director, U. S. Geological Survey, Washington, D. C. He is not allowed to receive postage stamps or personal checks in payment.

Expenditures

Table 2.—*Total expenditures July 1, 1913, to June 30, 1915*

General appropriation—		
Balance on hand July 1, 1913	$ 736.74	
Appropriation July 1, 1913	25,000.00	
Appropriation July 1, 1914	25,000.00	
Total available		$50,736.74
Expenditures July 1, 1913 to June 30, 1915—		
Salary and expenses of administration	9,112.69	
Clerical help and general office expenses	6,696,37	
Postage for distribution of bulletins	1,190.78	
Oil investigations	4,003.33	
Coal investigations (exclusive of mining study)	457.34	
Cooperative geological surveys (quadrangles)	4,633.05	
General stratigraphic studies	896.01	
Water resources investigations	2,158.18	
Clay resources investigations (exclusive of mining study)	42.44	
Geological surveys (quadrangles)	601.53	
Educational series	1,356.81	
Statistics	574.14	
Special field equipment	585.90	
Topographic surveys	18,304.72	50,613.29
Balance available July 1, 1915		$ 123.45
Special appropriation for coal mining study—		
Balance on hand July 1, 1913	42.22	
Appropriation July 1, 1913	4,500.00	
Appropriation July 1, 1914	4,500.00	
Total available		9,042.22
Expenditures July 1, 1913 to June 30, 1915—		
Coal resources	4,424,75	
Chemical work on coals	330.45	
Office supplies	2.90	
Special field equipment	177.63	
Collection of drill records	1,404.06	
Clays available at coal mines	557.51	
Surface subsidence due to mining	792.44	
Administration, clerical help, and drafting	840.52	
Telephone, telegraph, express, and freight	33.32	
Postage	200.00	8,763.58
Balance available July 1, 1915		$ 278.64

EXPENDITURES—*Concluded*

Special appropriation for survey and study of overflowed lands—		
Balance on hand July 1, 1913	$ 496.48	
Appropriation July 1, 1913	7,500.00	
Total available		7,996.48
Expenditures July 1, 1913 to June 30, 1915		4,281.87
Balance available July 1, 1915		$ 3,714.61
Preparation of Illustrations and printing—		
Balance on hand July 1, 1913	$ 3.83	
Appropriation July 1, 1913	5,000.00	
Appropriation July 1, 1914	5,000.00	
Total available		10,003.83
Expenditures July 1, 1913 to June 30, 1915		9,883.79
Balance available July 1, 1915		$ 120.04

MINERAL RESOURCES OF ILLINOIS IN 1913 AND 1914

By Helen J. Skewes

OUTLINE

ILLUSTRATION

TABLES

TABLES—(concluded)

INTRODUCTION

Acknowledgments

The mineral statistics in 1913 and 1914 were collected by the U. S. Geological Survey and Illinois State Geological Survey in cooperation. The figures used in this paper are compilations by the U. S. Geological Survey from reports made by individual operators.

General Review

Illinois ranked third in total value of mineral production in 1913 and 1914, the preceding positions having been held by Pennsylvania and West Virginia. This prominence is due chiefly to its larger output of coal and petroleum, and to the development of the clay industries. As a manufacturer of pig iron and coke Illinois stands high, but since the material is imported, the value of this product can not be included in the total. As a producer of fluorspar Illinois enjoys an international reputation as its deposits in Pope and Hardin counties are the largest in the world. Portland cement is also a leading product and is growing rapidly.

TABLE 3.—*Output and value of mineral products in Illinois, 1910-1914*

Product	1910		1911		1912		1913		1914	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Asphalt ----------short tons	----------	----------	(c)	(c)	(c)	(c)	(c)	(c)	41,553	$340.862
Briquets ----------short tons	----------	----------	(b) (c)	(b) (c)	(b) (c)	(b) (c)	----------	----------	----------	----------
Cement ----------barrels	[a]4,459,450	[a]$4,119,012	[a]4,582,341	[a]$3,583,301	[a]4,602,617	[a]$3,444,085	[a]4,734,540	[a]$4,784,696	[a]5,284,022	[a]4,848,522
Clay products ----------	----------	15,176,161	----------	14,333,011	----------	15,210,990	----------	15,195,874	----------	13,318,953
Coal ----------short tons	45,900,246	52,405,897	53,679,118	59,519,478	59,885,226	70,294,338	61,618,744	70,313,605	57,589,197	64,693,529
Coke ----------short tons	1,514,504	[b]6,712,550	1,610,212	[b]6,390,251	1,764,944	[b]8,069,903	1,859,553	[b]8,593,581	1,425,168	[b]5,858,700
Ferro-alloy ----------long tons	----------	----------	(b) (c)	(b) (c)	(b) (c)	(b) (c)	(b) (c)	(b) (c)	(b) (c)	(b) (c)
Fluorspar ----------short tons	47,302	277,764	68,817	481,635	114,410	756,653	85,854	550,815	73,811	426,063
Iron, pig ----------long tons	2,675,646	[b]42,917,362	2,036,081	[b]31,152,927	2,806,378	[b]42,828,816	2,892,263	[b]45,796,966	1,793,714	[b]24,382,458
Lead ----------short tons	262	23,056	964	86,760	1,282	115,380	959	84,392	717	55,926
Lime ----------short tons	113,239	503,581	92,169	423,762	98,450	394,892	95,977	433,331	87,603	362,727
Mineral paints, zinc and lead pigments	(c)	(c)	----------	----------	(c)	(c)	(c)	(c)	(c)	(c)
Mineral waters ----------gallons sold	1,117,620	83,148	1,304,950	82,330	1,143,625	74,445	1,216,442	68,549	1,760,030	81,307
Natural gas ----------	----------	613,642	----------	687,726	----------	616,467	----------	574,015	----------	437,275
Petroleum ----------barrels	33,143,362	19,669,383	31,317,038	19,734,339	28,601,308	24,332,605	23,893,899	30,971,910	21,919,749	25,426,179
Pyrite ----------long tons	8,541	28,159	17,441	47,020	27,008	62,980	11,246	31,966	22,538	59,079
Sand and gravel ----------short tons	8,586,508	1,730,795	8,488,683	1,990,922	6,957,901	1,929,822	7,992,140	2,070,491	7,696,130	1,859,519
Silver ----------fine ounces	2,000	1,100	3,036	1,609	4,731	2,909	3,541	2,139	2,112	1,168
Stone ----------	----------	3,853,425	----------	3,467,930	----------	3,841,504	----------	4,140,953	----------	2,934,078
Sulphuric acid [d](60° Baumé) short tons	----------	----------	144,805	958,591	160,378	1,064,564	195,145	1,303,986	243,457	1,551,876
Tripoli ----------	----------	33,390	----------	45,910	----------	27,339	----------	128,892	----------	59,394
Zinc ----------short tons	351	167,508	4,219	480,966	4,065	560,970	2,236	250,432	4,811	490,722
Miscellaneous ----------	----------	1,720,002	----------	1,199,475	----------	1,992,632	----------	1,756,126	----------	1,272,055
Total ----------	$98,840,729		$106,275,115		$123,068,867		$131,825,221		$117,145,108	

[a]Exclusive of natural cement, value for which is included under "Miscellaneous".
[b]Value not included in "Total".
[c]Value included under "Miscellaneous".
[d]From zinc smelting.

A record in total value of mineral production was made for Illinois in 1913 (Table 3) due largely to the remarkable advance in prices of petroleum. In 1914 the values for both coal and petroleum fell decidedly and the total value of mineral output declined about 8 per cent.

COAL

In both 1913 and 1914 Illinois ranked third in total quantity and in total value of coal mined, having produced in these years respectively 10.8 per cent and 11.2 per cent of the total output for the United States. Pennsylvania and West Virginia held the first and second ranks among coal-producing states.

The year 1913 was a record breaker for quantity of output of coal in Illinois (Table 4). This was occasioned partly by the increased demand from states to the west, due to a diminished supply of gas and to strikes

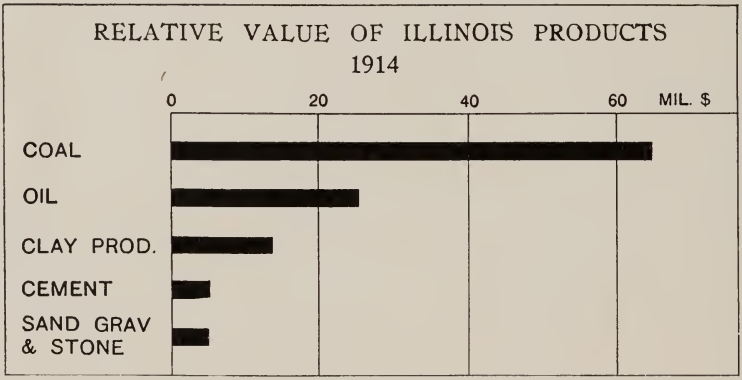


Fig. 1.—Relative values of leading products in Illinois in 1914.

in the more western fields, as in Colorado. In spite of this demand and increased wages of mine workers, the value per ton at the mines decreased from an average of $1.17 in 1912 to $1.14 in 1913.

In 1914 the quantity of coal mined declined 6.5 per cent and the value 8 per cent as compared with 1913 (Table 4). This decrease was due largely to the biennial shut-down that varied in duration in different districts from 30 to 60 days. A drought in southern Illinois and Indiana affected business seriously and increased costs, as water had to be shipped into many districts in tank cars to keep the mines operating. The average value per ton declined to $1.12.

Of the 48 coal-producing counties during these two years, 16 reported over one million tons (Table 5). In 1913 the decreasing ranks of the first 7 counties were Williamson, Franklin, Sangamon, Macoupin, St. Clair, Saline, and Madison; in 1914 Franklin County outranked Williamson, and these were followed by Sangamon, Macoupin, Madison, and St. Clair.

TABLE 4.—*Production of coal in Illinois, by counties, in short tons, 1910-1914*

County	1910	1911	1912	1913	1914
Bond	139,398	119,250	232,571	223,786	123,730
Bureau	973,346	1,628,688	1,677,317	1,639,208	1,284,311
Calhoun	----------	1,400	1,156	----------	----------
Christian	1,223,295	1,222,259	1,467,846	1,504,716	1,486,053
Clinton	950,243	921,225	1,040,479	1,049,575	1,090,787
Franklin	1,778,768	3,555,586	4,442,284	6,072,102	7,311,209
Fulton	1,721,527	2,133,029	2,453,424	2,388,775	2,052,170
Gallatin	70,091	63,008	64,244	46,105	81,735
Greene	9,082	6,207	7,841	5,009	6,665
Grundy	600,281	776,800	540,787	401,527	388,368
Hancock	640	320	----------	----------	1,678
Henry	124,243	90,722	58,613	43,383	47,010
Jackson	584,240	687,753	703,190	723,863	601,697
Jefferson	10,000	9,500	21,032	35,000	9,051
Knox	28,295	30,136	22,293	18,280	14,150
La Salle	1,178,885	1,610,470	1,537,591	1,564,459	1,279,593
Livingston	162,898	89,423	65,774	63,877	64,461
Logan	409,244	334,860	466,528	351,666	352,181
McDonough	26,338	8,027	14,446	12,603	5,251
McLean	83,982	96,517	89,781	88,777	78,008
Macon	235,361	236,203	291,590	206,140	217,217
Macoupin	3,854,229	4,688,212	4,986,574	5,097,619	4,555,834
Madison	4,102,773	3,152,705	4,025,878	3,732,153	3,546,256
Marion	812,873	1,224,326	1,311,024	988,964	906,837
Marshall	267,447	423,984	449,660	426,490	383,331
Menard	332,557	190,477	177,578	120,174	76,603
Mercer	229,024	297,552	393,018	408,875	372,528
Montgomery	1,799,720	2,395,814	2,182,823	2,689,702	2,597,677
Morgan	1,300	1,268	1,000	1,222	[a]906
Peoria	810,595	1,037,362	1,225,574	1,163,073	1,055,323
Perry	1,367,771	1,272,292	1,444,114	2,013,128	2,236,480
Putnam	364,882	772,976	720,048	724,170	605,863
Randolph	1,025,557	777,746	798,163	763,472	956,582
Rock Island	66,207	65,983	66,817	35,672	36,022
St. Clair	5,788,567	3,931,479	4,734,840	4,383,459	3,246,322
Saline	2,459,650	3,820,410	4,417,874	4,189,003	3,746,656
Sangamon	4,449,634	5,137,835	5,714,742	5,875,853	5,679,595
Schuyler	2,427	6,138	4,573	1,855	2,781
Scott	2,400	464	460	600	1,000
Shelby	135,672	81,615	185,501	193,632	196,339
Stark	32,582	37,293	34,176	14,610	12,703
Tazewell	155,659	220,783	171,321	341,626	335,566
Vermilion	2,515,250	3,385,200	3,424,923	3,501,880	2,394,081
Warren	10,275	9,044	5,021	3,383	1,510
Washington	22,500	25,000	244,879	319,370	497,000
White	23,722	35,681	27,052	22,304	32,111
Will	124,652	178,397	130,806	149,926	136,758
Williamson	4,620,372	6,614,029	7,354,507	7,644,397	7,066,029
Woodford	125,823	164,001	185,499	[b]302,184	315,840
Small mines	85,969	109,759	157,994	71,097	98,340
Total	45,900,246	53,679,118	59,885,226	61,618,744	57,589,197
Total value	$52,405,897	$59,519,478	$70,294,338	$70,313,605	$64,693,529

[a]Includes production of Johnson County.
[b]Includes production of Moultrie County.

The increased use of mining machinery has increased the efficiency in the labor employed. In 1911 the output per man was 3.7 tons for each working day; in 1914 it was 4.2 tons.

TABLE 5.—*Production of coal in Illinois, by counties, in short tons, 1913 and 1914*

1913

County	Loaded at mines for shipment	Sold to local trade and used by employees	Used at mines for steam and heat	Total quantity	Total value	Average value per ton	Average number of days active	Average number of employees
Bureau	1,514,958	55,964	68,286	1,639,208	$2,614,561	$1.60	207	3,790
Christian	1,353,559	79,286	71,871	1,504,716	1,672,004	1.11	156	2,294
Clinton	1,001,903	11,601	36,071	1,049,575	1,021,262	.97	157	1,377
Franklin	5,872,038	42,254	157,810	6,072,102	7,007,904	1.15	220	5,662
Fulton	2,282,585	45,776	60,424	2,388,775	3,055,825	1.28	191	3,569
Gallatin	41,214	3,884	1,007	46,105	50,835	1.10	113	148
Grundy	361,221	23,598	16,708	401,527	663,649	1.65	153	1,148
Henry	320	41,388	1,675	43,383	79,015	1.82	180	113
Jackson	641,946	27,912	54,005	723,863	1,028,754	1.42	174	974
Knox	--------	17,672	608	18,280	34,318	1.88	189	51
La Salle	1,125,740	364,790	73,929	1,564,459	2,738,704	1.75	237	2,893
Livingston	1,524	61,154	1,199	63,877	104,901	1.64	248	100
Logan	268,696	55,273	27,697	351,666	435,250	1.24	193	597
McDonough	1,682	10,921	--------	12,603	27,656	2.19	161	35
Macoupin	4,908,004	71,020	118,595	5,097,619	5,057,710	.99	193	5,472
Madison	3,534,531	105,390	92,232	3,732,153	3,824,161	1.02	157	4,393
Marion	945,572	18,356	25,036	988,964	998,143	1.01	175	1,438
Marshall	340,639	62,174	23,677	426,490	776,171	1.82	217	1,078
Menard	77,673	35,577	6,924	120,174	151,633	1.26	148	281
Mercer	374,846	18,305	15,724	408,875	580,790	1.42	198	581
Montgomery	2,603,826	37,975	47,901	2,689,702	2,797,777	1.04	187	3,086
Peoria	1,048,737	91,910	22,426	1,163,073	1,432,687	1.23	206	1,519
Perry	1,918,763	30,146	64,219	2,013,128	2,055,441	1.02	190	2,267
Randolph	711,894	28,316	23,262	763,472	772,579	1.01	149	1,003
Rock Island	2,062	29,810	3,800	35,672	54,677	1.53	132	75
St. Clair	4,105,508	187,707	90,244	4,383,459	4,192,122	.96	175	4,785
Saline	4,065,766	33,728	89,509	4,189,003	4,739,217	1.13	200	4,911
Sangamon	5,457,986	255,273	162,594	5,875,853	6,277,960	1.07	164	7,775
Shelby	165,489	18,678	9,465	193,632	259,053	1.34	167	406
Stark	3,775	10,315	520	14,610	26,060	1.78	141	46
Tazewell	268,412	67,015	6,199	341,626	417,709	1.22	246	433
Vermilion	3,268,325	174,752	58,803	3,501,880	4,007,167	1.14	214	4,058
Will	130,668	14,358	4,900	149,926	285,640	1.91	187	387
Williamson	7,379,489	67,203	197,705	7,644,397	8,263,104	1.08	180	9,472
Other counties[a] and small mines	1,549,728	369,486	85,683	2,004,897	2,809,166	1.40	214	3,312
Total	57,329,079	2,568,957	1,720,708	61,618,744	70,313,605	$1.14	189	79,529

[a]Bond, Greene, Jefferson, McLean, Macon, Morgan, Moultrie, Putnam, Schuyler, Scott, Warren, Washington, White, and Woodford.

TABLE 5.—*Production of coal in Illinois, by counties, in short tons, 1913 and 1914* —Concluded

1914

County	Loaded at mines for shipment	Sold to local trade and used by employees	Used at mines for steam and heat	Total quantity	Total value	Average value per ton	Average number of days active	Average number of employees
Bureau	1,211,076	37,035	36,200	1,284,311	$2,138,716	$1.67	186	3,404
Christian	1,365,081	75,474	45,498	1,486,053	1,677,143	1.13	164	2,007
Clinton	1,040,902	13,956	35,929	1,090,787	1,110,044	1.02	153	1,579
Franklin	7,023,068	79,782	208,359	7,311,209	8,533,516	1.17	199	7,661
Fulton	1,960,370	49,534	42,266	2,052,170	2,588,881	1.26	167	3,407
Gallatin	79,540	1,575	620	81,735	84,135	1.03	185	129
Greene	--------	6,590	75	6,665	13,330	2.00	164	21
Grundy	352,299	23,657	12,412	388,368	686,992	1.77	147	1,264
Henry	--------	45,232	1,778	47,010	75,791	1.61	213	92
Jackson	545,992	19,101	36,604	601,697	855,951	1.42	145	928
Knox	--------	13,650	500	14,150	27,230	1.92	192	36
La Salle	849,159	371,963	58,470	1,279,592	2,242,493	1.75	188	2,810
Livingston	12,863	47,770	3,828	64,461	106,380	1.65	217	87
Logan	250,031	73,215	28,935	352,181	460,647	1.31	158	748
McDonough	--------	5,251	--------	5,251	10,695	2.04	181	26
Macoupin	4,387,704	80,537	87,593	4,555,834	4,363,318	.96	166	5,486
Madison	3,369,242	93,198	83,816	3,546,256	3,509,461	.99	167	3,824
Marion	871,319	12,243	23,275	906,837	904,590	.99	202	1,112
Marshall	301,152	60,231	21,948	383,331	708,250	1.85	235	918
Menard	40,409	33,780	2,414	76,603	103,206	1.35	95	266
Mercer	342,329	16,141	14,058	372,528	538,637	1.45	177	479
Montgomery	2,526,076	29,134	42,467	2,597,677	2,636,581	1.01	182	2,886
Peoria	950,300	86,474	18,549	1,055,323	1,267,777	1.20	183	1,540
Perry	2,148,936	40,688	46,856	2,236,480	2,173,488	.97	197	2,574
Randolph	895,995	31,466	29,121	956,582	937,564	.98	169	1,226
Rock Island	--------	35,308	714	36,022	62,703	1.74	140	72
St. Clair	3,017,040	160,330	68,952	3,246,322	2,951,890	.91	132	4,696
Saline	3,640,096	28,451	78,109	3,746,656	4,034,121	1.08	171	5,667
Sangamon	5,284,214	258,576	136,805	5,679,595	5,955,278	1.05	168	7,150
Shelby	168,105	19,489	8,745	196,339	248,641	1.27	149	362
Stark	200	12,353	150	12,703	25,181	1.98	151	34
Tazewell	276,552	54,217	4,797	335,566	412,466	1.23	217	456
Vermilion	2,194,218	156,228	43,635	2,394,081	2,716,631	1.13	170	3,488
Will	117,347	13,551	5,860	136,758	240,192	1.76	178	379
Williamson	6,832,513	53,316	180,200	7,066,029	7,500,210	1.06	166	9,149
Other counties[a] and small mines.	1,529,262	377,007	79,766	1,986,035	2,791,400	1.41	185	3,536
Total	53,583,390	2,516,503	1,489,304	57,589,197	64,693,529	$1.12	173	79,499

[a]Bond, Hancock, Jefferson, Johnson, McLean, Macon, Morgan, Moultrie, Putnam, Schuyler, Scott, Warren, Washington, White, and Woodford.

COKE

All Illinois coke in 1913 and 1914 was made in retort ovens at South Chicago, Joliet, and Waukegan. These establishments draw most of their coal from Pennsylvania and West Virginia.

In 1913 the statistics showed an increase of 5.4 per cent in quantity and 6.5 per cent in value of coke produced, as compared with the previous year. In 1914 there was a decided decrease in this industry amounting to 24.5 per cent in quantity and 32.2 per cent in value. Table 6 presents the statistics of the manufacture of coke in Illinois during the past 5 years.

TABLE 6.—*Statistics of the manufacture of coke in Illinois, 1910-1914*

Year	Establishments	Ovens		Coal used	Yield of coal in coke	Coke produced	Total value of coke at ovens	Value of coke at ovens per ton
		Built	Building					
				Short tons	*Per cent*	*Short tons*		
1910	5	508	----	1,972,955	76.8	1,514,504	$6,712,550	$4.43
1911	4	506	48	2,087,870	77.1	1,610,212	6,390,251	3.97
1912	6	594	40	2,316,307	76.2	1,764,944	8,069,903	4.57
1913	4	568	58	2,481,198	74.9	1,859,553	8,593,581	4.62
1914	4	[a]586	[b]40	1,932,132	73.8	1,425,168	5,858,700	4.11

[a]Includes 253 Semet-Solvay, 315 Koppers, and 18 Wilputte ovens.
[b]Semet-Solvay ovens.

PIG IRON

In both 1913 and 1914 Illinois ranked third in output of pig iron, having been preceded by Pennsylvania and Ohio. A record was made in 1913, but in accordance with the condition of the iron industry throughout the country in 1914, Illinois showed a decrease in the production of pig iron amounting to 38.0 per cent, and in value amounting to 46.8 per cent, as compared with the figures for the preceding year. The rank of third among the states was maintained, having been preceded by Pennsylvania and Ohio. The manufacture of this product in Illinois is from ore shipped into Chicago and vicinity from Michigan, Wisconsin, and Minnesota. The statistics for pig iron in Illinois from 1911 to 1914 are given in Table 7.

TABLE 7.—*Production in long tons and value of pig iron in Illinois, 1911-1914*

Year	Quantity	Value	Average price per ton
1910	2,675,646	$42,917,362	$15.91
1911	2,036,081	31,152,927	15.30
1912	2,806,378	42,828,816	15.26
1913	2,892,263	45,796,966	15.83
1914	1,793,714	24,382,458	13.57

PETROLEUM

In 1913 and 1914 Illinois held third rank among the oil-producing states, having been preceded by California and Oklahoma. In 1913 this State produced 9.62 per cent of the total quantity for the United States, and in 1914 it was 8.25 per cent. Because of the high quality of the oil, the value of the Illinois output in 1913 was 13.06 per cent of the total value for the country, and in 1914 it was 11.87 per cent.

A sharp decline of 16.5 per cent in total quantity of oil produced was felt in 1913, and the decrease continued in 1914 when it amounted to 8.3 per cent. Because of marked advances in prices in 1913 the total value of the output was 27.3 per cent over the previous year; but in 1914 a loss of 17.9 per cent was felt. Tables 8 to 11 give the history of oil production and the fluctuation in prices for the last three years.

TABLE 8.—*Marketed production in barrels and value of petroleum in Illinois, 1889-1914*

Year	Marketed production	Percentage of U. S. production	Value	Yearly average price per barrel
1889-1904	6,576	----	--------	----
1905	181,084	0.14	$ 116,561	$ .644
1906	4,397,050	3.47	3,274,818	.745
1907	24,281,973	14.62	16,432,947	.677
1908	33,686,238	18.76	22,649,561	.672
1909	30,898,339	16.87	19,788,864	.640
1910	33,143,362	15.82	19,669,383	.593
1911	31,317,038	14.21	19,734,339	.630
1912	28,601,308	12.88	24,332,605	.851
1913	23,893,899	9.62	30,971,910	1.296
1914	21,919,749	8.25	25,426,179	1.160

TABLE 9.—*Marketed production of petroleum in Illinois, by months, in barrels, 1910-1914*

Month	1910	1911	1912	1913	1914
January	2,640,303	2,578,579	2,241,867	2,149,264	1,935,492
February	2,353,684	2,373,229	2,262,440	1,859,412	1,570,790
March	2,865,055	2,790,515	2,369,428	2,008,245	1,969,915
April	2,776,800	2,560,963	2,351,693	2,015,058	1,833,099
May	2,860,760	2,731,965	2,535,039	2,117,425	1,970,688
June	2,746,620	2,634,521	2,503,038	2,003,278	1,932,303
July	3,029,787	2,740,654	2,698,582	2,075,444	1,907,521
August	3,007,151	2,770,946	2,519,651	2,001,228	1,844,983
September	2,850,119	2,615,120	2,366,712	1,942,052	1,817,437
October	2,768,750	2,638,927	2,424,472	1,982,002	1,813,364
November	2,629,132	2,400,670	2,174,856	1,819,116	1,678,783
December	2,615,201	2,480,949	2,153,530	1,921,375	1,645,374
Total	33,143,362	31,317,038	28,601,308	23,893,899	21,919,749

TABLE 10.—*Average daily output of petroleum in Illinois, by months and years, in barrels, 1910-1914*

Month	1910	1911	1912	1913	1914
January	85,171	83,180	72,318	69,331	62,435
February	84,060	84,758	78,015	66,407	56,100
March	92,421	90,017	76,433	64,782	63,546
April	92,560	85,365	78,390	67,169	61,103
May	92,283	88,128	81,775	68,304	63,570
June	91,554	87,817	83,435	66,776	64,410
July	97,735	88,408	87,051	66,950	61,533
August	97,005	89,385	81,279	64,556	59,516
September	95,004	87,171	78,890	64,735	60,581
October	89,315	85,127	78,209	63,936	58,496
November	87,638	80,022	72,495	60,637	55,959
December	84,361	80,031	69,469	61,980	53,076
Average	90,804	85,800	78,146	65,463	60,054

TABLE 11.—*Fluctuation in prices, per barrel, of Illinois petroleum, 1912-1914*

Date	Above 30° B	Below 30° B	Date	Above 30° B	Below 30° B	Date	All grades
1912			1913			1914	
Jan. 1	$0.67	$0.57	Jan. 1	$1.08	$1.05	Jan. 1	$1.45
Jan. 2	.70	.60	Jan. 3	1.08	----	Apr. 18	1.40
Jan. 6	.72	.62	Jan. 27	1.11	----	Apr. 25	1.35
Jan. 24	.75	.65	Feb. 2	1.14	----	Apr. 28	1.30
Feb. 1	.78	.68	Feb. 5	1.17	----	May 1	1.25
Mar. 4	.81	.71	Feb. 6	1.20	----	May 5	1.20
Apr. 24	.83	.73	Feb. 20	1.25	----	May 12	1.15
May 24	.85	.75	Apr. 16	1.30	----	June 17	1.12
June 13	----	.77	Nov. 5	1.35	----	Aug. 1	1.07
June 27	----	.79	Nov. 19	1.40	----	Aug. 7	1.02
July 25	.87	.82	Nov. 22	1.45	----	Sept. 14	.97
Sept. 12	----	.84				Sept. 23	.92
Oct. 28	.90	.87				Oct. 26	.89
Nov. 9	.92	.89					
Nov. 15	.94	.91					
Nov. 25	.96	.93					
Dec. 2	.99	.96					
Dec. 9	1.02	.99					
Dec. 16	1.05	1.02					
Dec. 20	----	1.05					
Dec. 23	1.08	1.05					

Lawrence County is the richest oil-producing area in Illinois where the accumulation is governed by a strong double-plunging anticline. Seven sands ranging in depths from 450 to 1,985 feet contain large quantities of high-grade oil. In 1913 several isolated pools were opened in Lawrenceville, but general drilling was handicapped by the drought. In 1914 considerable impetus was given to the development of this territory by a 3,100-barrel gusher from the McClosky sand in sec. 5, Dennison Township, on

the 6th of April. A substantial eastern and southeastern addition to the productive area followed and kept the total output for the county in 1914 practically equal to that of the previous year.

Crawford County stands second among the oil-producing counties of the State. Most of the new wells were put down within the fields already defined, and very little new territory was opened up. Near the end of 1913 oil was found on a town lot in the north part of Robinson, and this was rapidly developed and exhausted early in 1914 owing to the small extent of the pool.

The Allendale field of Wabash County discovered in 1912 continued to yield a small production.

In south-central Illinois the Carlyle pool continued to decline. The Sandoval pool in Marion County showed a steady yield with a slight decline. In Macoupin County the Carlinville field was composed of 6 gas and 8 oil wells in 1913, the yield having been about 200 barrels daily; but in 1914 the production fell below 100 barrels daily from 3 wells.

The latest development of oil territory in Illinois is the western field in McDonough County. In April, 1914, a 75-barrel well at a depth of 417 feet on the J. Hoing farm in the SW. ¼ NW. ¼ sec. 16, T. 4 N., R. 4 W. (Lamoine), aroused considerable excitement. Before the end of the year of the 174 wells that had been drilled in this Colmar field 36 were barren, and 138 yield a total initial daily production of 3,919 barrels. This discovery of oil is of especial interest as it followed recommendations by the State Geological Survey[1] in cooperation with the U. S. Geological Survey on the folio work for the Colchester and Macomb quadrangles.

During 1913 and 1914 unsuccessful tests were made near Equality, Harrisburg, Duquoin, Murphysboro, Hoffman, Hoyleton, Edwardsville, Millstadt, Pinkstaff, Kinsman, Lexington, Dundas, Anna, Olive Branch, Villa Grove, Mahomet, Sorento, Ava, Staunton, Collinsville, Ohlman, Nokomis, Cottage Grove, Birmingham, Brooklyn, Camden, Mode, Shelby, and Allerton.

The total number of wells drilled in Illinois up to January 1, 1915, has been estimated to be 24,566, of which number 4,120 or 16.7 per cent were dry.

The record of drilling in Illinois in 1913 and 1914 is given in Tables 12 and 13.

[1]Hinds, Henry, Oil and gas in the Colchester and Macomb quadrangles: Ill. State Geol. Survey Extract Bull. 23, pp. 11-13, 1914.

TABLE 12.—*Number of oil wells completed in Illinois, by months, 1913 and 1914*

Month	1913				1914			
	Oil	Gas	Dry	Total	Oil	Gas	Dry	Total
January	106	2	23	131	126	7	15	148
February	83	2	22	107	103	4	28	135
March	71	6	12	89	116	2	18	136
April	92	--	13	105	148	2	41	191
May	137	1	21	159	116	3	35	154
June	112	6	35	153	123	5	52	180
July	139	3	28	170	98	3	37	138
August	116	2	38	156	98	3	39	140
September	145	2	16	163	111	--	28	139
October	151	--	31	181	69	2	27	98
November	115	4	24	143	48	1	14	63
December	96	53	15	164	35	--	22	57
Total	1,363	80	278	1,721	1,191	32	356	1,579

TABLE 13.—*County record of wells drilled in Illinois, 1913 and 1914*

1913

County	Oil	Total initial daily production	Average initial daily production	Gas	Dry	Total
		Bbls.	*Bbls.*			
Clark	169	2,610	15.4	4	35	208
Clinton	14	134	9.6	----	5	19
Coles	3	75	25.0	----	3	6
Crawford	540	9,990	18.5	19	110	669
Cumberland	49	595	12.1	1	11	61
Hancock	----	----	----	----	----	----
Jasper	2	30	15.0	----	----	2
Lawrence	538	32,316	60.1	56	69	663
McDonough	----	----	----	----	----	----
Macoupin	3	165	55.0	----	6	9
Marion	21	492	23.4	----	1	22
Wabash	24	998	----	----	24	48
Miscellaneous	----	----	----	----	14	14
Total	1,363	47,405	34.8	80	278	1,721

1914

Clark	157	1,590	10.1	2	62	221
Clinton	2	20	10.0	----	2	4
Coles	16	172	10.7	----	5	21
Crawford	542	8,613	15.9	28	136	706
Cumberland	22	127	15.8	----	2	24
Hancock	1	45	45.0	----	19	20
Jasper	3	28	9.3	----	2	5
Lawrence	294	24,324	82.7	2	69	365
McDonough	138	3,919	28.4	----	36	174
Macoupin	3	15	5.0	----	2	5
Marion	6	70	11.6	----	1	7
Wabash	7	345	49.3	----	5	12
Miscellaneous	----	----	----	----	15	15
Total	1,191	39,268	33.0	32	356	1,579

NATURAL GAS

The estimated quantity of natural gas produced in Illinois in 1913 was 4,767,128,000 cubic feet, valued at $574,015; in 1914 it was 3,547,841,000 cubic feet, valued at $437,275. By far the largest amount of the gas is used for domestic purposes; of that used industrially five times as much is used for power as for manufacturing. Most of that consumed for power was used for engines and boilers for operating in the oil fields. Some of the gas is so rich in gasoline that a few plants have been installed for the extraction of this product.

TABLE 14.—*Record of natural-gas industry in Illinois, 1906-1914*

Year	Gas produced		Gas consumed			Wells		
	Number of producers	Value	Number of consumers		Value	Drilled		Productive Dec. 31
			Domestic	Industrial		Gas	Dry	
1906	66	$87,211	1,429	2	$87,211	----	----	200
1907	128	143,577	2,126	61	143,577	94	41	283
1908	185	446,077	[a]7,377	[a]204	[a]446,077	121	42	400
1909	194	644,401	[a]8,458	[a]518	[a]644,401	56	11	423
1910	207	613,642	[a]10,109	[a]261	[a]613,642	64	31	458
1911	225	687,726	[a]10,078	[a]293	[a]687,726	69	78	458
1912	223	616,467	[a]10,691	[a]212	[a]616,467	56	147	453
1913	231	574,015	[a]10,423	[a]279	[a]574,015	60	119	455
1914	235	437,275	[a]8,952	[a]153	[a]437,275	38	114	417

[a]Includes number of consumers and value of gas consumed in Vincennes, Ind.

TABLE 15.—*Depth and rock pressure of wells in Illinois, 1910-1914, by counties*

County	Depth, in feet	Pressure, in pounds				
		1910	1911	1912	1913	1914
Bond	925—1,100	200—750	100—350	40—410	35—355	40—350
Lawrence	700—1,900					
Bureau	98— 357	0— 23	0— 42	0— 80	0— 42	0— 35
Champaign	80— 140	15— 32	15— 30	0— 20	0— 30	0— 30
Clark	250— 610	35— 45	10— 60	15—105	0— 30	-------
Crawford	400—1,550	20—225	10—150	20—200	20—350	25—450
Cumberland	500—1,000	-------	-------	-------	-------	65
Dewitt	85— 127	25— 50	20— 50	0— 50	0— 25	0— 20
Edgar	230— 600	75—127	50— 90	75—130	50—135	80—135
Lee	126— 280	18— 28	19— 28	12— 28	12— 28	15— 28
Logan	84— 90	-------	-------	-------	-------	-------
McHenry	160— 372	-------	10— 22	-------	-------	-------
McLean						
Macoupin						
Montgomery	55— 67	-------	-------	-------	1— 2	-------
Morgan	226— 400	-------	0—100	0—100	0— 96	0— 20
Pike	89— 350	4— 10	1— 20	0— 10	0— 9	0— 53

The principal areas of commercial gas production are coextensive with the oil fields. The larger part of the gas comes from Cumberland, Clark, Crawford, and Lawrence counties, where the Pennsylvanian series and Chester group of the Mississippian series are productive.

Greenville, Bond County, is supplied by four wells from sands a depths of 925 and 1,055 feet in the Chester group. Heyworth, McLean County, obtains its supply from the glacial drift. Throughout Bureau, Champaign, Dewitt, Edgar, Lee, Morgan, Montgomery, and Pike counties many wells in the drift supply one or two families each.

GASOLINE

The casing-head gasoline industry in Illinois is very recent. It reached an important development in 1913, and in 1914 the output was increased 100 per cent, though the market depression brought down the prices so greatly that the increase in total value was only about 50 per cent. The gasoline industry is confined to the fields of Crawford and Lawrence counties where the content of gas ranges from 2 to 5.5 gallons per thousand cubic feet, the number in 1914 having been 2.52 gallons. Table 16 shows the development of the industry in 1913 and 1914.

TABLE 16.—*Production of gasoline from natural gas in Illinois, 1913 and 1914*

	1913	1914
Number of plants	12	14
Quantity ----------gals.	581,171	1,164,178
Value	$67,106	$100,331
Price per gallon----------cents	11.54	8.62
Gas used ----------cu. ft.	160,304,000	462,321,000
Average yield of gas per M cubic feet ------gals.	3.63	2.52

ASPHALT

In 1913 and 1914 oil asphalt was manufactured from crude petroleum. The figures for 1913 must be concealed, but in 1914 four refineries produced 41,553 short tons valued at $340,862. This was marketed entirely for road oil and for flux.

CLAY-WORKING INDUSTRIES

CLAY

The clay-mining industry in Illinois made considerable progress in 1913, but declined somewhat in 1914. In both years Illinois ranked fourth in quantity and fifth in value of clay mined.

Fire clay is by far the most important clay mined, and Table 17 shows that a steady progress is being made in its output. The figures for both

TABLE 17.—*Production in short tons and value of clay mined and marketed in Illinois, 1910-1914*

Year	Fire clay		Other clays		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
1910	82,878	$111,078	105,925	$78,818	188,803	$190,896
1911	71,479	91,623	111,357	92,203	182,836	183,826
1912	92,963	110,204	83,595	82,459	176,558	192,663
1913	106,216	125,477	88,721	78,560	194,937	204,037
1914	125,071	138,876	36,013	29,478	161,084	168,354

1913 and 1914 give Illinois fifth rank in total quantity and value of this product, the preceding states having been Pennsylvania, New Jersey, Ohio, and Missouri. The average price for fire clay in Illinois in 1913 was $1.18; in 1914 it was $1.11. La Salle County, where the clay below coal No. 2 has been found to be very refractory, led in the production of fire clay, with about 40 per cent of the total. Other counties reporting this kind of clay were McDonough, Scott, Union, Green, Grundy, and Livingston.

Stoneware clay, brick clay, and other kinds were mined in Brown, Calhoun, Fulton, and Ogle counties.

CLAY PRODUCTS

In total value of clay products Illinois ranked fourth in 1913 and 1914, as it has for a great many years, the preceding positions having been held by Ohio, Pennsylvania, and New Jersey. The 1913 value of production showed a slight decline, and in 1914 the decrease was 12.35 per cent (Table 18).

Every variety of clay products except china was manufactured in Illinois. In 1913 this State ranked first in quantity and value of common brick; second in value of architectural terra cotta and in the value of vitrified paving brick; third in quantity of vitrified paving brick and in value of enameled brick; fourth in value of draintile; fifth in value of sewerpipe and fireproofing; sixth in quantity of front brick and fire brick; and seventh in value of front brick and fire brick.

For 1914 in the value and quantity of common brick and in the value of architectural terra cotta, this State ranked first, although the number of common brick was the lowest since 1901; in the value and quantity of vitrified paving brick, second; in the value of front brick, and in the value of draintile, fourth; and in the value of sewer pipe and fireproofing, fifth.

Of the 102 counties in Illinois, 80 reported a production of clay products. The Cook County value of output was approximately 30 per cent of the total State value, this being the largest brick-making county in the country. Almost one-third of the total State value was in common brick, of

TABLE 18.—*Clay products of Illinois, 1910-1914*

Product	1910	1911	1912	1913	1914
Brick:					
Common—					
Quantity	1,196,526,000	1,074,486,000	1,210,499,000	1,155,480,000	941,343,000
Value	$6,896,836	$6,126,911	$6,437,331	$6,445,821	$4,898,698
Average per M	$5.76	$5.70	$5.32	$5.58	$5.20
Vitrified—					
Quantity	115,903,000	124,623,000	136,708,000	133,938,000	157,176,000
Value	$1,415,355	$1,627,683	$1,839,721	$1,883,199	$2,086,344
Average per M	$12.21	$13.06	$13.46	$14.06	$13.27
Front—					
Quantity	22,138,000	19,786,000	21,894,000	29,566,000	46,995,000
Value	$274,699	$240,135	$268,433	$363,010	$506,984
Average per M	$12.41	$12.14	$12.26	$12.28	$10.79
Fancy or ornamental—value	$10,875	$10,281	$8,785	$2,295	(a)
Enameled —do	(a)	(a)	(a)	(a)	(a)
Fire —do	$368,730	$286,039	$319,619	$351,324	$274,106
Stove lining—do					(a)
Draintile —do	$1,613,698	$1,372,049	$1,189,910	$1,225,190	$1,041,927
Sewer pipe—do	$538,633	$507,694	$500,844	$787,896	$743,986
Architectural terra cotta—do	$1,680,438	$1,879,275	$2,485,012	$1,908,399	$1,652,945
Fireproofing —do	$552,905	$552,994	$507,222	$592,337	$567,266
Tile, not drain—do	(a)	(a)	(a)	$82,168	(a)
Pottery:					
Red earthenware—do	$25,658	$41,875	$35,827	$46,175	$37,452
Stoneware and yellow and Rockingham ware—value	$708,958	$832,813	$675,244	$624,194	$483,407
White ware, including C. C. ware white granite, semi-porcelain ware, and semi-vitreous porcelain ware, value		(a)	(a)	(a)	(a)
Sanitary ware —value	(a)	(a)	(a)	(a)	(a)
Porcelain electrical supplies, value		(a)	(a)	(a)	(a)
Miscellaneous —value	$1,089,376	$855,262	$943,042	$883,866	$1,025,838
Total value	$15,176,161	$14,333,011	$15,210,990	$15,195,874	$13,318,953
Number of active firms reporting	346	330	301	281	263
Rank of State	4	4	4	4	4

(a) Included in "Miscellaneous."

which Cook County manufactured approximately two-thirds. Architectural terra cotta ranked second in value in 1913 and third in 1914 and was mostly from Cook County. Third in importance in 1913 and second in 1914 was vitrified paving brick most of which was from Knox and Livingston counties. Table 19 gives by counties the production of the common brick and draintile for Illinois in 1913 and 1914.

In manufacture of pottery Illinois held seventh place in 1913 and 1914. Stoneware was the pottery product of greatest value, constituting about 60 per cent of the total. It was made in Brown, Green, La Salle, McDonough, Tazewell, and Warren counties. In 1913 sales were reported by 23 operators; in 1914 by 22.

TABLE 19.—*Production and value of brick and draintile in Illinois, by counties, 1913 and 1914*

County	1913			1914		
	Common brick		Draintile	Common brick		Draintile
	Thousands	Value	Value	Thousands	Value	Value
Adams	5,399	$39,575	--------	4,553	$32,211	--------
Bureau	4,484	27,001	$59,961	2,677	15,863	$51,314
Christian	1,965	12,135	16,459	993	7,418	5,791
Clark	510	3,300	(a)	(a)	(a)	--------
Cook	117,682	3,675,534	(a)	597,694	2,661,476	--------
Edgar	--------	--------	28,000	--------	--------	12,700
Edwards	3,713	23,705	7,794	2,254	14,403	3,322
Fulton	7,292	44,512	(a)	8,420	45,690	(a)
Gallatin	521	3,700	4,900	461	3,310	3,450
Grundy	(a)	(a)	57,972	(a)	(a)	63,964
Hancock	1,259	9,125	13,179	1,466	10,605	1,444
Henry	995	7,013	6,184	720	5,700	3,176
Iroquois	234	1,638	61,038	284	1,542	5,403
Kane	2,225	13,905	(a)	(a)	(a)	(a)
Kankakee	84,717	398,307	105,174	45,487	152,281	(a)
La Salle	2,516	16,178	226,378	2,061	12,555	185,758
Livingston	15,094	107,284	43,494	12,377	86,569	36,677
Logan	1,026	6,090	(a)	858	5,703	(a)
McDonough	2,375	16,950	20,991	2,450	18,000	27,486
McLean	5,079	30,480	8,285	(a)	(a)	(a)
Macon	2,850	20,725	(a)	6,100	38,700	(a)
Madison	15,918	92,592	(a)	10,416	65,637	(a)
Marion	585	3,705	(a)	485	2,813	(a)
Montgomery	4,162	29,014	17,327	2,552	16,243	2,666
Menard	3,021	18,103	(a)	(a)	(a)	--------
Morgan	1,763	12,650	(a)	1,469	10,807	(a)
Peoria	4,192	26,552	(a)	(a)	(a)	--------
Rock Island	4,950	34,650	(a)	4,330	35,608	(a)
St. Clair	38,173	264,750	(a)	28,064	180,070	(a)
Saline	4,300	28,900	(a)	(a)	(a)	(a)
Sangamon	7,421	45,507	47,873	9,014	80,124	36,603
Tazewell	20,100	101,934	22,000	17,607	88,089	(a)
Vermilion	(a)	(a)	(a)	(a)	(a)	5,250
White	971	6,553	13,110	1,180	7,995	18,791
Will	1,200	6,800	(a)	(a)	(a)	(a)
Other counties[b]	788,788	1,316,954	465,071	177,371	1,299,286	568,132
Total	1,155,480	$6,445,821	$1,225,190	941,343	$4,898,698	$1,041,927

[a]Concealed in "Total."

[b]In 1913, including: Boone, Cass, Champaign, Clark, Clinton, Coles, Cook, Crawford, Dekalb, Dewitt, Douglas, Dupage, Effingham, Fayette, Ford, Franklin, Fulton, Greene, Grundy, Hamilton, Jackson, Jefferson, Jersey, Kane, Kendall, Knox, Lake, Lawrence, Lee, Logan, McHenry, Macon, Macoupin, Madison, Mason, Massac, Menard, Mercer, Monroe, Moultrie, Ogle, Peoria, Pike, Randolph, Rock Island, St. Clair, Richland, Saline, Schuyler, Scott, Shelby, Stark, Stephenson, Vermilion, Warren, Washington, Wayne, Williamson, and Woodford counties.

In 1914, including: Boone, Cass, Champaign, Clark, Clinton, Coles, Dekalb, Dewitt, Douglas, Dupage, Effingham, Fayette, Ford, Fulton, Greene, Grundy, Hamilton, Hancock, Jackson, Jefferson, Jersey, Kane, Kankakee, Knox, Lake, Lawrence, Lee, Logan, McLean, Macon, Macoupin, Madison, Marion, Mason, Massac, Menard, Mercer, Monroe, Morgan, Moultrie, Ogle, Peoria, Pike, Randolph, Richland, Rock Island, St. Clair, Saline, Schuyler, Shelby, Stark, Stephenson, Tazewell, Vermilion, Warren, Washington, Wayne, Will, Williamson, Winnebago, and Woodford counties.

STONE

Sandstone

The total value of the material reported as sandstone in 1914 in Illinois was $72,738, a figure that shows an increase of 252.7 per cent as compared with 1913 and which far exceeds any previous output. Practically all the production was from Alexander County, but Henry, Lee, Randolph, and Union counties have quarried small amounts in both 1913 and 1914. This classification as sandstone of the productions of these companies is very misleading; the output from Alexander and Union counties is really a flint or chert from a 115-foot bed of Devonian age. In Lee County the quarry is operating in a portion of the Galena-Trenton which is soft and granular and might easily be taken for sandstone. In Randolph County the output may be from a sandstone in the Mississippian series; no definite data could be found regarding this location. At Chester the Palestine sandstone of the Chester series has been used for building purposes, but no report of production was made in 1914.

Limestone

The limestone production in 1913 was high, but a sharp decline of 31 per cent in 1914 caused a drop from fourth to fifth rank among the limestone-producing states, the order of the first four having been Pennsylvania, Ohio, Indiana, and New York. Not since 1904 has the output been so low. Cook County has always been the leading limestone-producing county, and in 1914 its production was valued at $1,319,415, or 46 per cent of the State total value. The four counties of following ranks were Will, value $316,609; St. Clair, value $223,679; Vermilion; and Kankakee, the values for the last two counties having been concealed because each had fewer than three producers.

Central Illinois is so heavily drift covered that at only a very few locations in this portion of the State have quarries been opened. The outcrops are confined almost entirely to the river courses in the northern part of the State and along the Mississippi. Over 60 per cent of the limestone quarried in Illinois was Niagaran mostly from Cook, Will, Dupage, and Kane counties; a little came from Savanna and Port Byron on Mississippi River. In the central-northern counties the Galena-Trenton was worked at Belvidere, Rockford, Dixon, Oregon, and Freeport. At Moline the Hamilton limestone of Devonian age supplied a small amount, the only place in the State where the Devonian was quarried for limestone. Along the Mississippi from Henderson County to Randolph County and along the Ohio in Pope and Hardin counties outcrops along the bluffs afford economical sites for many quarries. Several limestones of Mississippian age were worked for stone in the western and southern parts of Illinois. The Burlington and

Keokuk limestones were quarried in Henderson County and at Quincy and Marblehead in Adams County; the Keokuk limestone at Hamilton and Warsaw in Hancock County; the Salem limestone near Jonesboro in Union County; the St. Louis limestone at Niota in Hancock County, at Alton in Madison County, south of East St. Louis in St. Clair County, at Columbia in Monroe County, at Prairie du Rocher in Randolph County, and at Elizabethtown in Hardin County; the Ste. Genevieve limestone at Alton in Madison County, south of East St. Louis in St. Clair County, and in the southwest corner of Johnson County; the Yankeetown chert at Millstadt; and a limestone ledge in the Okaw formation at Menard. Definite geologic data at several other quarry locations are unavailable. The limestone above coal No. 6 at Belleville was used commercially. In Vermilion County, at Fairmount, is a lens of limestone in the McLeansboro above coal No. 7 from which large amounts were taken to the Chicago steel mills for blast furnace flux; this quarry also supplies considerable for Portland cement. The Quarry Creek limestone near Casey and Marshall in Clark County was of economic importance in 1914.

Most of the limestone quarried in Illinois is high in magnesium. The Ordovician beds are mainly magnesian, although a little high calcium limestone of this age is found. The Silurian (Niagaran) limestones are also magnesian, but the Devonian limestones are very high in percentage of calcium carbonate. Most of the Carboniferous limestones are high in calcium and low in magnesium, but the Mississippian limestones are likely to contain a considerable amount of silica in the form of chert.

About one-third of the limestone produced in Illinois in 1914 was used for concrete, and slightly less than one-third for road making. Railroad ballast and flux demanded large fractions of the total, and other uses are building, paving, curbing, rubble, riprap, glass manufacture, fertilizer, and lime.

TABLE 20.—*Values of production of sandstone and limestone in Illinois, 1910-1914*

Year	Sandstone	Limestone
1910	$ 5,710	$3,847,715
1911	30,953	3,436,977
1912	32,720	3,808,784
1913	28,781	4,112,172
1914	72,738	2,861,340

LIME

In 1913 and 1914 lime was burned at 16 plants located in the following counties named in order of rank: Cook, Adams, Madison, Winnebago, Whiteside, Will, Rock Island, and Kankakee. The production of Cook County was approximately 50 per cent of the State total, and Adams County

TABLE 22.—*Production in short tons and values of different kinds of sand and gravel in Illinois, 1910-1914*

Year	Glass sand		Molding sand		Building sand		Grinding and polishing sand		Fire and furnace sand	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Short tons		*Short tons*		*Short tons*		*Short tons*		*Short tons*	
1910	268,654	$216,531	407,232	$215,742	1,756,652	$473,209	--------	--------	97,633	$60,932
1911	251,907	171,978	237,359	120,690	1,875,814	691,846	59,880	$41,765	62,107	25,643
1912	323,467	225,434	540,728	268,521	1,910,911	598,884	67,040	49,196	(a)	(a)
1913	350,229	239,227	404,717	181,794	2,299,834	594,687	42,198	23,138	84,801	43,269
1914	339,551	246,803	347,543	200,011	1,196,873	383,209	58,351	38,780	60,674	24,569

Year	Engine sand		Paving sand		Other sands		Gravel		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Short tons		*Short tons*		*Short tons*		*Short tons*		*Short tons*	
1910	43,147	$6,840	--------	--------	1,211,564	$130,756	4,801,626	$626,785	8,586,508	$1,730,795
1911	46,897	6,158	318,671	$125,624	1,862,000	164,292	3,774,048	642,926	8,488,683	1,990,922
1912	59,151	12,916	30,581	13,958	499,685	75,391	3,481,638	664,552	6,957,901	1,929,822
1913	79,568	11,166	101,631	30,973	171,898	77,252	4,457,264	868,985	7,992,140	2,070,491
1914	93,299	12,239	121,812	39,851	522,808	120,635	4,955,219	793,422	7,696,130	1,859,519

(a) Concealed in "Total."

about 30 per cent. Illinois ranked twelfth among the lime-producing states. For several years the lime industry here has changed very little.

Both high-calcium and high-magnesium lime were manufactured in Illinois, as both kinds of limestone were quarried. Adams, Carroll, Madison, and Will counties reported high-calcium, and Cook, Kankakee, Rock Island, Whiteside, and Winnebago counties high-magnesium lime.

CEMENT

In 1913 and 1914 the five companies operating Portland cement plants in Illinois were located at South Chicago, La Salle (2), Oglesby, and Dixon. Because of a decline of nearly 18 per cent in the production of California in 1914, New York and Illinois each advanced in ranks to third and fourth places respectively, Pennsylvania and Indiana having held first and second ranks. Table 21 shows the figures for the production of Portland cement in Illinois from 1910 to 1914.

The Utica Cement Company is producing natural cement from the Lower Magnesian limestone and operates one of the 12 natural cement plants of the country.

TABLE 21.—*Portland cement industry in Illinois, 1910-1914*

(Figures opposite P relate to production; those opposite S to shipments)

Year		Number of plants	Quantity	Value	Average price per barrel
			Barrels		
1910	P	5	4,459,450	$4,119,012	$0.90
1911	P	5	4,582,341	3,583,301	.79
1912	P	5	4,299,357	3,212,819	----
	S	5	4,602,617	3,444,085	.75
1913	P	5	5,083,799	5,109,218	----
	S	5	4,734,540	4,784,696	1.01
1914	P	5	5,401,605	5,007,288	----
	S	5	5,284,022	4,848,522	.92

SAND AND GRAVEL

In 1914 the quantity of production of sand and gravel in Illinois relegated New York to second rank and gave this State first place, although the difference was small. In value of output Illinois held fourth place in both 1913 and 1914, having been preceded by Pennsylvania, New York, and Ohio. In 1913 the total value of output was the highest ever reached, but 1914 showed a drop of 3.6 per cent in quantity and 10.2 per cent in value (Table 22). The St. Peter sandstone which is very pure and friable is being worked at the outcrops at Utica, Ottawa, Wedron, Millington, and Oregon, and makes excellent glass sand. All the rest of the production in Illinois is from alluvial deposits and pockets in the drift.

Of the 35 counties reporting a production of this material, La Salle led with over 25 per cent of the State total. Other counties of prominence were

TABLE 23.—*Production in short tons and value o*

1913

County	Producers	Glass sand		Molding sand		Building sand		Grinding and polishing sand		Fire c furnac sand
		Quan.	Value	Quantity	Value	Quantity	Value	Quan.	Value	Quantit
Bond	3	------	--------	15,953	$1,367	2,025	$683	------	------	-------
Bureau	6	------	--------	4,840	1,710	10,024	3,244	------	------	-------
Carroll	5	------	--------	--------	--------	1,342	968	------	------	-------
Kane	13	------	--------	33,413	10,129	563,633	108,456	------	------	-------
La Salle	17	303,356	$208,317	307,949	134,805	1,750	919	42,198	$23,138	82,3
Lee	7	------	--------	--------	--------	1,368	306	------	------	-------
McHenry	6	------	--------	11,800	7,370	407,046	103,049	------	------	-------
Madison	3	------	--------	10,051	10,673	82,604	23,317	------	------	-------
Ogle	4	32,873	19,710	--------	--------	--------	--------	------	------	-------
Peoria	10	------	--------	81	57	41,495	15,808	------	------	-------
Rock Island	5	438	--------	4,384	2,837	58,050	11,400	------	------	-------
Tazewell	5	------	--------	--------	--------	16,936	5,094	------	------	-------
Wabash	3	------	--------	--------	--------	61	15	------	------	-------
Whiteside	5	------	--------	2,226	1,793	48,676	17,061	------	------	-------
Will	4	------	--------	--------	--------	88,134	31,373	------	------	-------
Winnebago	5	------	--------	12,270	9,203	292,377	90,658	------	------	-------
Other counties[a]	24	14,000	11,200	1,750	1,850	684,313	179,336	------	------	2,50
State total	125	350,229	$239,227	404,417	$181,794	2,299,834	$594,687	42,198	$23,138	84,80

[a]Including: Alexander, Boone, Clinton, Cook, DeKalb, DuPage, Fulton, Henderson, Kendall, Lake, Logan, Maco

1914

County	Producers	Glass sand		Molding sand		Building sand		Grinding and polishing sand	
		Quan.	Value	Quantity	Value	Quantity	Value	Quantity	Value
Bond	5	------	--------	13,510	$13,018	135	$65	--------	-------
Bureau	8	------	--------	3,100	2,015	13,649	3,496	--------	-------
Carroll	3	------	--------	320	250	2,520	1,500	--------	-------
Cook	4	------	--------	--------	--------	130,775	52,070	--------	-------
Kane	12	------	--------	120,293	24,605	148,483	39,064	--------	-------
La Salle	18	273,334	$207,195	168,978	129,764	150	75	58,351	$38,78
Lee	6	------	--------	--------	--------	3,300	1,500	--------	-------
McHenry	6	936	515	6,000	4,200	198,240	61,124	--------	-------
Madison	3	------	--------	1,972	2,315	88,190	22,280	--------	-------
Ogle	4	62,281	36,543	--------	--------	--------	--------	--------	-------
Peoria	12	------	--------	658	360	38,892	16,519	--------	-------
Rock Island	7	------	--------	5,246	5,201	50,595	11,343	--------	-------
Tazewell	4	------	--------	--------	--------	18,310	10,117	--------	-------
Whiteside	5	------	--------	1,228	986	2,392	1,156	--------	-------
Will	7	------	--------	8,000	4,000	8,404	3,367	--------	-------
Winnebago	7	------	--------	12,739	8,010	241,970	86,413	--------	-------
Other counties[a]	21	3,000	2,550	5,499	5,287	331,328	87,400	--------	-------
State total	133	339,551	$246,803	347,543	$200,011	1,277,333	$401,089	58,351	$38,780

[a]Including: Alexander, Boone, Cass, Clinton, DeKalb, DuPage, Henderson, Kendall, Lake, Logan, Menard

d and gravel in Illinois, by counties, 1913 and 1914

or iace id	Engine sand		Paving sand		Railroad ballast		Other sands		Gravel		Total	
ue	Quan.	Value	Quan.	Value	Quan.	Value	Quan.	Value	Quantity	Value	Quantity	Value
----	-----	------	1,350	$700	-----	------	135	$65	2,100	$560	21,563	$3,375
----	97	$58	------	------	-----	------	------	------	71,130	26,226	86,091	31,238
----	-----	------	281	260	-----	------	270	250	1,960	2,000	3,853	3,478
----	-----	------	------	------	-----	------	------	------	563,572	116,016	1,160,618	234,601
,644	11,000	6,600	------	------	-----	------	71,000	60,750	12,267	4,175	831,821	480,348
----	-----	------	3,000	1,000	-----	------	------	------	8,063	1,262	12,431	2,568
----	-----	------	------	------	-----	------	52,395	3,022	526,170	134,890	997,411	251,331
----	-----	------	------	------	-----	------	------	------	--------	--------	93,355	34,340
----	-----	------	506	75	-----	------	------	------	323,695	22,743	357,074	42,528
----	-----	------	1,729	1,297	18,397	$9,199	------	------	78,949	49,157	140,651	75,518
----	-----	------	------	------	-----	------	------	------	123,458	51,700	185,892	65,937
----	2,200	616	31,061	11,006	-----	------	7,160	2,148	1,228,701	105,676	1,286,058	124,540
----	-----	------	4,200	2,700	-----	------	------	------	31,500	7,650	35,761	10,365
----	-----	------	150	50	-----	------	------	------	77,250	32,250	128,302	51,154
----	-----	------	32,448	7,571	-----	------	------	------	596,541	121,976	717,123	161,920
----	39,489	1,362	------	------	1,444	50	542	19	134,480	29,429	480,602	130,721
,625	26,002	2,180	26,906	6,314	20,000	1,600	555	149	677,428	162,273	--------	--------
,269	79,568	$11,166	101,631	$30,973	39,841	$10,849	132,057	$66,403	4,457,264	$868,985	7,992,140	$2,070,491

cer, Piatt, Pike, St. Clair, Stephenson, Vermilion, and White counties.

e or furnace sand		Engine sand		Paving sand		Other sands		Gravel		Total	
ıtity	Value	Quan.	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
----	------	------	------	700	$200	700	$100	2,400	$840	17,445	$14,223
----	------	92	$55	675	250	--------	--------	49,272	18,536	66,788	24,352
----	------	------	------	--------	--------	--------	--------	3,800	1,125	6,640	2,875
----	------	------	------	27,000	10,000	156,638	26,106	227,445	32,201	541,858	121,377
----	------	------	------	--------	--------	48,807	16,270	294,986	69,696	621,569	139,635
,674	$24,569	10,100	6,025	--------	--------	17,374	11,743	705,860	80,877	1,294,821	499,028
----	------	------	------	5,850	1,200	--------	--------	13,040	2,140	22,190	4,840
----	------	------	------	--------	--------	109,897	9,825	118,897	32,289	433,970	107,953
----	------	------	------	--------	--------	965	750	--------	--------	91,127	25,345
----	------	------	------	--------	--------	--------	--------	190,000	21,165	252,281	57,708
----	------	------	------	4,415	1,657	16,290	5,702	144,444	54,341	204,699	78,579
----	------	------	------	--------	--------	37,800	14,000	80,983	24,475	174,624	55,019
----	------	255	71	29,964	10,761	--------	--------	582,237	74,983	630,766	95,932
----	------	41,559	1,433	476	129	1,804	810	17,175	12,025	64,634	16,539
----	------	------	------	--------	--------	65,810	19,669	807,364	195,386	889,578	222,422
----	------	------	------	1,426	32	887	20	791,049	32,089	1,048,071	126,564
----	------	41,293	4,655	51,306	15,622	65,836	15,640	938,497	343,271	1,436,759	474,425
,674	$24,569	93,299	$12,239	121,812	$39,851	522,808	$120,635	4,967,449	$795,867	7,788,820	$1,879,844

er, Monroe, Piatt, Pike, St. Clair, Sangamon, Wabash, and White counties.

Cook, Kane, McHenry, Will, and Winnebago. Table 23 presents the detailed statistics for the sand and gravel industry by counties.

FLUORSPAR

The total output of fluorspar in 1913 and 1914 was from three producers in Hardin County and included gravel, lump, and ground grades. Since 1905 Illinois has led in the production of fluorspar, and Kentucky now stands second. Table 24 shows the marketed production and value of fluorspar in Illinois from 1902 to 1914. This Kentucky-Illinois district is practically the only American source of spar for the general market. It is used mainly in steel making and foundry work; but a small amount of the output running less than one per cent silicia is used in the enameling, chemical, and glass trades.

TABLE 24.—*Production in short tons and value of fluorspar in Illinois, 1902-1914*

Year	Quantity	Value	Year	Quantity	Value
1902	18,360	$121,532	1909	41,852	$232,251
1903	11,413	57,620	1910	47,302	277,764
1904	17,205	122,172	1911	68,817	481,635
1905	33,275	220,206	1912	114,410	756,653
1906	28,268	160,623	1913	85,854	550,815
1907	25,128	141,971	1914	73,811	426,063
1908	31,727	172,838			

MINERAL WATER

The production of mineral water in Illinois for 1913 and 1914 was from 21 springs, Gravel Spring near Jacksonville, Morgan County, having been the most valuable. The record of the State in quantity and value of this product for the past 5 years is shown in Table 25. Although the production for 1914 far exceeded that of any preceding year the value was only a little above the average for the past 10 years. The price per gallon has declined notably since 1907, due probably to the improvement of municipal supplies.

TABLE 25.—*Production in gallons and value of mineral waters in Illinois, 1910-1914*

Year	Number of springs	Quantity	Value	Average price per gallon
1910	16	1,117,620	$83,148	$0.07
1911	14	1,304,950	82,330	.06
1912	17	1,143,625	74,445	.07
1913	21	1,216,442	68,549	.06
1914	21	1,760,030	81,307	.05

TRIPOLI OR SILICA

Tripoli is the only form of silica mined commercially in Illinois. All the production in 1913 and 1914 was from 8 producers in Alexander and Union counties, where heavy beds of disintegrated, pure Devonian chert outcrop. This fine, white siliceous powder is used as paint, wood filler, metal polish, in soaps, cleansers, glass manufacture, and for facing foundry molds. Table 26 shows the quantity and value of tripoli in Illinois from 1909 to 1914.

TABLE 26.—*Production in short tons and value of tripoli mined in Illinois, 1909-1914*

Year	Quantity	Value
1909	------	$ 38,262
1910	------	33,390
1911	------	45,910
1912	------	27,339
1913	12,994	128,892
1914	10,387	59,394

PYRITE AND SULPHURIC ACID

The output of pyrite in 1913 fell off so markedly (Table 27) that Illinois was relegated from fourth to seventh rank in this industry. The increase of over 100 per cent in the production of pyrite in 1914 restored Illinois to fourth rank, Virginia, California, and Ohio having held the preceding positions.

The industry of pyrite mining in Illinois is only incidental, being associated with coal mining. Especially in Vermilion County, the value of whose production was 96 per cent of the State total, is the industry developed, since the pyrite (or marcasite in reality) occurs in the coal of this district in distinct lenses and bands instead of being finely disseminated throughout the coal as in most parts of the State. Madison and Knox counties also produced a little pyrite. Miners are paid by the ton for the pyrite thrown out of the coal, an inducement to load as clean and marketable coal as possible.

TABLE 27.—*Production in long tons and value of pyrite mined in Illinois, 1909-1914*

Year	Quantity	Value	Average price per ton
1909	5,600	$17,551	$2.60
1910	8,541	28,159	3.30
1911	17,441	47,020	2.70
1912	27,008	62,980	2.33
1913	11,246	31,966	2.84
1914	22,538	59,079	2.62

The sulphuric acid produced in Illinois is a by-product in the smelting of zinc in which process the waste gases, sulphur dioxide and sulphur trioxide, are converted into acid. The grade, 60° Beaumé, given in Table 3 is

78.04 per cent sulphuric acid, and the amount produced in the Illinois smelters in 1914 was equivalent to about 111,000 long tons of pyrite associated with the ore.

LEAD, ZINC, AND SILVER

The lead and zinc deposits of Illinois fall in two areas of very different geologic character. In Jo Daviess County the ores occur in gently folded sedimentary rocks; whereas in Hardin and Pope counties they are associated with fluorspar in fissure veins, which are controlled by jointing and faulting.

The market falling off in the output of lead and zinc for 1913 was due largely to the low price of ore. In 1914 when prices were slightly higher, lead continued to decline, but the zinc production about doubled (Table 29). In northern Illinois lead has been becoming less and less important, and zinc has been advancing. All activity in this area was in the Galena district. In southern Illinois the production of lead is only an incidental industry in connection with the mining of fluorspar, yet a notable percentage of the State total comes from this location. In 1913 and 1914 the poor demand for fluorspar checked mining operations to some extent and caused the decline of lead output.

The galena of southern Illinois (Table 29) is notably argentiferous, the silver content ranging up to 12 and 14 fine ounces per ton of lead concentrates, but averaging 4 to 7 fine ounces per ton for the past five years. An increasing recovery of silver per ton of lead concentrates indicates that the galena at lower levels contains the greater silver content.

MINERAL PAINTS

The only mineral paints made in Illinois are sublimed white lead or "basic lead sulphate" and sublimed blue lead or "blue fume", both manufactured at Collinsville, Madison County.

TABLE 28.—*Tenor of lead and zinc ore and concentrates in Illinois, 1913-1914*

	1913	1914
NORTHERN ILLINOIS		
Total crude ore ----------short tons----	119,200	261,300
Total concentrates in crude ore:		
Lead ----------per cent----	0.6	0.25
Zinc ----------per cent----	6.9	6.4
Metallic content of crude ore:		
Lead ----------per cent----	.5	.19
Zinc ----------per cent----	2.4	2.3
Average lead content of galena concentrates------per cent----	78.1	76.2
Average zinc content of sphalerite concentrates--per cent----	34.8	36.5
Average value per ton:		
Galena concentrates ----------	$53.80	$44.70
Sphalerite concentrates ----------	$19.23	$19.13
SOUTHERN ILLINOIS		
Average lead content of galena concentrates-----per cent----	73.3	73.5
Average value per ton of galena concentrates----------	$46.08	$39.99

TABLE 29.—*Production and value of lead, zinc, and silver in Illinois, 1910-1914*

Year	District	Lead		Zinc		Silver	
		Quantity	Value	Quantity	Value	Quantity	Value
		Short tons		*Short tons*		*Fine ounces*	
1910	Northern Illinois ----------	101	$8,888	3,549	$383,292	------	------
	Southern Illinois ----------	272	23,936	------	------	2,022	$1,092
	Total ----------	373	32,824				
1911	Northern Illinois ----------	625	56,250	4,219	480,966	------	------
	Southern Illinois ----------	339	30,510	------	------	3,036	1,609
	Total ----------	964	86,760				
1912	Northern Illinois ----------	687	61,830	4,065	560,970	------	------
	Southern Illinois ----------	595	53,550	------	------	4,731	2,909
	Total ----------	1,282	115,380				
1913	Northern Illinois ----------	588	51,744	2,236	250,432	------	------
	Southern Illinois ----------	371	32,648	------	------	3,541	2,139
	Total ----------	959	84,392				
1914	Northern Illinois ----------	492	38,376	4,811	490,722	------	------
	Southern Illinois ----------	225	17,550	------	------	2,112	1,168
	Total ----------	717	$55,392				

COAL IN GILLESPIE AND MOUNT OLIVE QUADRANGLES

By Wallace Lee

(U. S. Geological Survey in cooperation with the Illinois State Geological Survey)

OUTLINE

ILLUSTRATIONS

INTRODUCTION

The investigations of the coal resources of the Mount Olive and Gillespie quadrangles were made in connection with the complete geological work of the area for folio publication by the U. S. Geological Survey. In a previous State report[1] the general geology of these quadrangles was discussed, but the accompanying log of a drill hole near Litchfield summarizes the stratigraphy.

Log of well NE. cor. NE. ¼ SE. ¼ sec. 29, T. 9 N., R. 5 W.

Description of strata	Thickness		Depth	
Pleistocene deposits—	*Ft.*	*in.*	*Ft.*	*in.*
Surface	15	..	15	..
Sand	1	..	16	..
Hardpan	29	..	45	..
McLeansboro formation—				
Clay, sandy, blue	18	..	63	..
Limestone	..	10	63	10
Clay	43	2	107	..
Sand, green	13	..	120	..
Gravel	3	..	123	..
Limestone, broken	12	..	135	..
Shale, sandy	2	..	137	..

[1]Lee, Wallace, Oil and gas in the Gillespie and Mount Olive quadrangles, Ill. State Geol. Survey Bull. 31, pp. 73-107, 1915.

Description of strata		Thickness		Depth	
McLeansboro formation—(*concluded*)		*Ft.*	*in.*	*Ft.*	*in.*
Slate, black		1	..	138	..
Shale, sandy		45	..	183	..
Limestone, dirty		1	..	184	..
Slate, black		1	7	185	7
Limestone, dirty		1	5	187	..
Coal, slaty		..	4	187	4
Shale, gray		6	8	194	..
Limestone with shale bands		5	..	199	..
Shale, sandy		24	..	223	..
Limestone		5	..	228	..
Sandstone		11	..	239	..
Shale, sandy		28	6	267	6
Shale, sandy		22	6	290	..
Sandstone		28	..	318	..
Shale		64	..	382	..
Limestone		5	..	387	..
Shale, sandy		13	..	400	..
Limestone		3	..	403	..
Shale		53	5	456	5
Carbondale formation—					
Coal	No. 6	1	1	457	6
Shale ("blue band")	No. 6	1	1	458	7
Coal	No. 6	1	5	460	..
Fire clay		1	..	461	..
Shale, blue		2	..	463	..
Conglomerate		3	..	466	..
Shale, hard gray		16	..	482	..
Slate, black		1	6	483	6
Coal, No. 5		1	1	484	7
Fire clay		2	5	487	..
Sandstone		46	2	533	2
Coal	No. 4	2	4	535	6
Shale	No. 4	..	4	535	10
Coal	No. 4	..	8	536	6
Shale		2	6	539	..
Sandstone, shale partings		17	..	556	..
Shale, dark sandy		34	..	590	..
Shale, black		1	11	591	11
Coal	No. 3 group	1	10	593	9
Shale	No. 3 group	2	3	596	..
Limestone	No. 3 group	3	..	599	..
Shale, soft	No. 3 group	1	2	600	2
Coal, slaty	No. 3 group	..	10	601	..
Coal	No. 3 group	2	7	603	7
Shale	No. 3 group	1	5	605	..
Limestone	No. 3 group	1	..	606	..
Shale, dark	No. 3 group	2	6	608	6
Coal	No. 3 group	..	9	609	3

Description of strata		Thickness		Depth	
Carbondale formation—(*concluded*)		*Ft.*	*in.*	*Ft.*	*in.*
Shale, soft		4	3	613	6
Fire clay		9	6	623	..
Shale, sandy		16	..	639	..
Sandstone		5	..	644	..
Slate, black		4	2	648	2
Coal	No. 2	..	9	648	11
Shale	No. 2	12	4	661	3
Coal	No. 2	..	10	662	1
Pottsville formation—					
Shale, sandy		14	11	667	..
Sandstone, shaly		10	..	687	..
Shale, sandy, dark		14	..	701	..
Limestone, broken		2	..	703	..
Coal, No. 1		4	10	707	10
Fire clay, hard		6	2	714	..
Shale, dark		3	..	717	..
Sandstone, shale parting		14	..	731	..
Limestone, shale parting		3	..	734	..
Shale, dark sandy bands		9	..	743	..
Sandstone, hard		2	..	745	..
Shale, sandy		22	..	767	..
Sandstone		26	..	793	..
Shale, blue		10	..	803	..
Sandstone		8	..	811	..

DESCRIPTION OF COAL BEDS

Coal No. 1

Coal No. 1, which was mined at a depth of about 700 feet at the recently closed mine at Litchfield, has been reported at a few other localities, but it is usually reported as black shale. Most of the holes that have been drilled to this depth, however, are oil wells; and as other coals thought to be present have been carelessly recorded as black shales, the absence of workable deposits of this coal is not conclusively demonstrated even where wells have been drilled to the proper depth. The coal in the Litchfield mine though of good quality was found to thin so sharply in one direction and to become so dirty in another, that it is said that had the test hole been placed one-half mile distant in either direction the shaft would probably not have been sunk. A variable character is attributed to this bed at other localities, and it is desirable that this bed be carefully tested elsewhere before exploitation is attempted.

Coal No. 2

Coal No. 2 or Murphysboro coal is split into two beds at most localities in the area. At Litchfield two beds 9 inches and 10 inches thick, respec-

tively, are separated by 12 feet 4 inches of shale (see accompanying log), but in a well drilled by the community near Walshville, two beds, 1 foot 10 inches and 3 feet 10 inches, respectively, the thicker lying below, are separated by 11 feet 6 inches of sandy shale. At the old Litchfield mine it is said to have consisted of two benches 2 feet 6 inches and 2 feet 4 inches thick, separated by 5 feet 6 inches of clay and shale.

At intermediate localities only one coal has been reported. Thus, at the Smith well in sec. 15, T. 7 N., R. 5 W., drilled by T. A. Rinaker, one bed 3 feet thick overlain by 7 feet of black slate was reported. In the Telfers well drilled by the Producers Oil Company in sec. 22, T. 8 N., R. 5 W., 4 feet of coal overlain by 5 feet of limestone was reported, and in the Mark Flitz well drilled by the same company in sec. 24, T. 8 N., R. 5 W., 7 feet of coal was reported; allowance must be made for the fact that these are churn drill records of oil wells.

Coal No. 3

None of the coals in the group of the horizon of coal No. 3 is now mined in the area, but it appears to be of workable thickness at a number of localities. Its stratigraphic position is approximately 135 feet below the top of coal No. 6. In sec. 5, T. 8 N., R. 5 W., the two upper beds are reported in a core-drill log to be 2 feet 9 inches and 3 feet 4 inches, respectively, and separated by 8 feet 10 inches of shale and limestone. The lower and thicker of these, however, is contaminated by "bands of shale". In the Telfers oil well drilled in sec. 22, T. 8 N., R. 5 W., by the Producers Oil Company a bed 4 feet thick was reported, whereas in the oil well drilled on the Smith farm,

Section of coal (Worthen No. 3) and associated strata at Litchfield shaft

	Thickness	
	Ft.	*in.*
Sandy shale	..	..
Black shale	1	11
Coal	1	10
Shale	2	3
Limestone	3	..
Shale	1	2
Coal, slaty	..	10
Coal	2	7
Shale	1	5
Limestone	1	..
Shale, dark	2	6
Coal	..	9
Shale and fire clay	..	..
	19	3

sec. 15, T. 7 N., R. 5 W., by T. A. Rinaker, 5 feet of coal is said to have been penetrated. Although the bed is thinner at other points the evidence

seems to indicate that valuable coal deposits occur at this horizon in some localities. The possibility of its presence in beds thick enough to work should not be overlooked in prospecting.

Coal No. 4

Coal No. 4, which lies about 75 feet below the top of coal No. 6, was worked temporarily in the Litchfield mine where it was thought to be the No. 6 or Herrin coal. The bed at this point is 3 feet 4 inches thick, including a 4-inch shale parting. In the oil well, already mentioned, drilled on the Smith farm, sec. 15, T. 7 N., R. 5 W., this bed is said to be 6 feet thick, and in the Patterson and Heydrick well drilled in sec. 20, T. 7 N., R. 4 W., it is reported to be 5 feet thick, though allowance must be made for the fact that the holes are churn-drill holes prospecting for oil. A core drill, however, in T. 8 N., R. 4 W., showed the presence of 8 feet of coal at this horizon which was reported as "coal and smut". In a diamond-drill hole on the Atterbury farm in sec. 6, T. 7 N., R. 4 W., 6 feet 8 inches of coal overlain by 4 feet 6 inches of limestone is reported. It is believed, therefore, that considerable coal of workable thickness may be found in this bed, though little is known of its quality. Since, however, though thin it was mistaken for coal No. 6 and mined for a time at Litchfield, the coal is no doubt of good grade at least locally. The failure to mine this coal more extensively is no doubt due to its thinness in both shafts at Litchfield.

Coal No. 5

Coal No. 5, or Springfield coal, which is so profitable to the north in the Springfield area, is reported to be of workable thickness at only one point in the two quadrangles here considered. In a diamond-drill hole in T. 7 N., R. 4 E., over 6 feet of coal was reported. This thickness is unusual, however, and the workable coal probably underlies a small area only. Coal No. 5 is frequently not reported at all in many detailed logs, though thicknesses of 2 or 3 feet are not uncommon.

Coal No. 6

Coal No. 6, or Herrin coal, is the thickest and most valuable coal in the area. As shown in figures 2 and 3, this coal rises irregularly from an altitude of 150 feet in the southeast corner of the area to over 400 feet near the western margin. In depth below the surface it ranges from about 100 to 450 feet. It lies nearer the surface than the other coals and may be mined under more favorable conditions. A thin band of dark clay shale, which lies from 8 to 20 inches above the base, is present in this coal everywhere throughout the southern part of Illinois and has given it the name of the "blue band" coal. It has a rather even thickness of from 6 to 8 feet over the western two-thirds of the area, though in the southwest corner there are

many rolls, and the thickness may change from 4 to 7 feet within very short distances (the length of a mine room). In a strip two or three miles wide on both sides of a line passing through Litchfield and Walshville coal No. 6 is for the most part too thin to work, and in some places it appears to be

Fig. 2.—Map of Gillespie quadrangle showing structure contours on coal No. 6.

absent. Farther east, particularly in the neighborhood of Hillsboro, the coal though generally present is entirely absent from distinctly channel-shaped areas, being cut off along a curving line in the mine workings by a steeply sloping surface which has been attributed to faulting. Drilling in

one case, however, has demonstrated very clearly that the coal was not displaced, but entirely absent for a width of about three-fourths of a mile, beyond which the coal is again present in undisturbed continuity at the same or nearly the same level. The cutting out of the coal is due probably to its

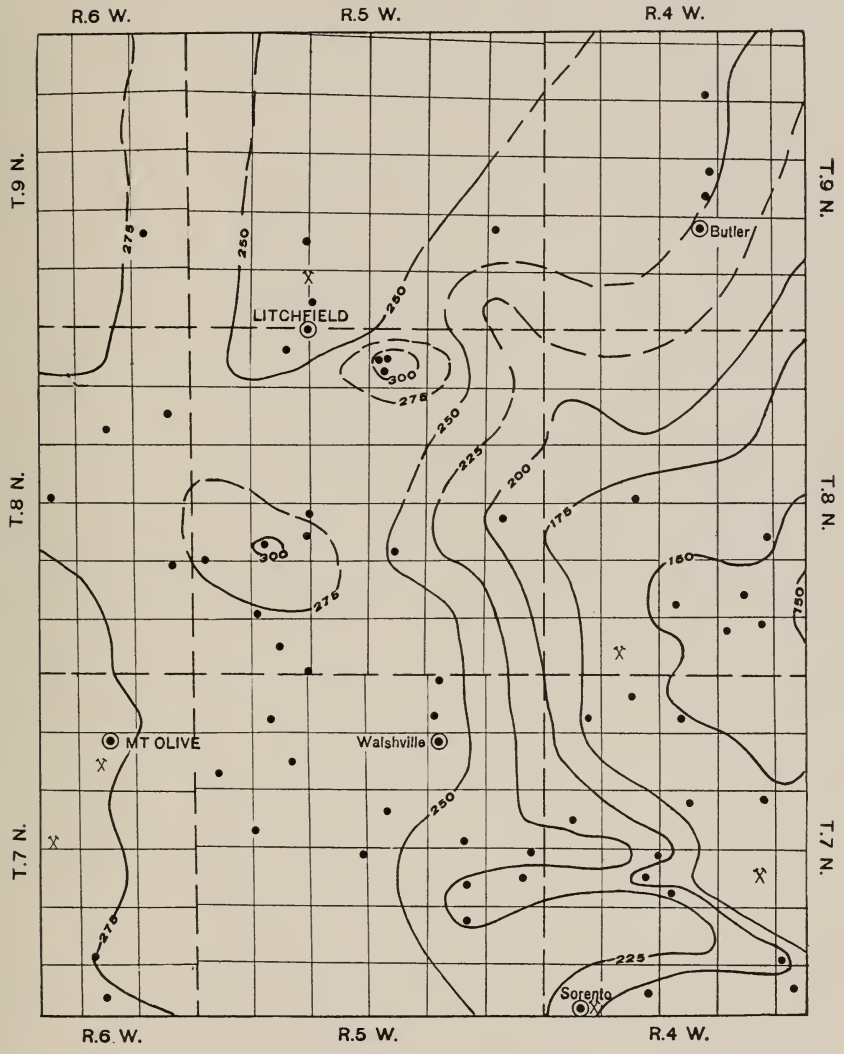


Fig. 3.—Map of Mount Olive quadrangle showing structure contours on coal No. 6.

erosion a short time after its deposition and to the subsequent filling of the channels with shale and sand. Logs of oil holes drilled north of Butler fail to report coal No. 6 in this area, but the unreliability of oil wells in relation to the coal has already been mentioned. It is not improbable, however, that

coal No. 6 may be found to be thin or absent in a considerable part of Butler Grove Township, though there is reason to believe that some of the lower beds are present in workable thickness.

The limestone mentioned as overlying coal No. 6 is a very valuable factor in the cheap mining of the coal. In parts of the area, however, this limestone is not present, and as the roof of the coal is difficult to hold in its absence, considerable areas in which the character, thickness, and continuity of the coal is otherwise satisfactory, are not at present considered profitable territory.

The roof limestone is absent throughout Honey Point Township and in the northern and eastern parts of Cahokia Township, and it is generally, though not everywhere, absent from the area mentioned in which the coal itself is thin.

Both the absence of the limestone and the thinning of the coal are due probably to the same cause. A short time after the deposition of the coal and limestone the land was slightly elevated above the sea, and broad shallow drains were cut in the new land surface. In localities farther from the streams the limestone only was eroded. Close to the drainage lines the coal and limestone were both affected, and in some localities, particularly near the channels, both the coal and some of the underlying shales were cut away. In the submergence that followed, the flat valleys became filled with sand and clay, in some places containing streaks of coaly material and continued accessions of sediment to and above the original position of the limestones succeeded in apparent conformity.

In some places the black shale above the coal includes or is replaced by a lenticular band of highly sulphurous and very black slate-like material that has a tendency to spontaneous combustion. Where this material is present it is a source of considerable inconvenience in mining, and when disturbed, areas of incipient and actual burning often have to be sealed off for months to extinguish the fires. The incoherent character of the McLeansboro formation permits the subsidence of the beds between the coal and the surface, a phenomenon of common occurrence in areas where the coal has been partly mined out. Entire beds in most places appear to subside by sheering around the undermined area, often causing a change of level of two or three feet at the surface.

Faulting is rare, and even the few known cases of faulting have a throw of only a few feet. At Panama several small faults are known, but the effect is not much more serious than the presence of pronounced "rolls".

As a rule very little gas is present, and the mines are practically dry. These conditions, together with the excellent roof and the comparatively slight depth of the coal below the surface, make the mining of coal No. 6 in

this area particularly inviting, and except near Litchfield where this coal is thin or absent little effort has been made to mine or even to prospect the lower coals.

As the areas of coal No. 6 become worked out, however, attention will turn to the deeper and less well-known coal seams, and though these beds occur for the most part under less desirable conditions than coal No. 6 and are of more variable thickness and grade, they form a great and very important coal reserve.

PENNSYLVANIAN FIRE CLAYS OF ILLINOIS

By Edwin H. Lines

OUTLINE

ILLUSTRATIONS

STRATIGRAPHY

Although a clay similar in appearance to fire clay and often loosely referred to as such lies below practically every coal bed in the Pennsylvanian formation, the only refractory clays occur at the base of the formation. In the western part of the State these clays outcrop at many points from Alton to Rock Island at the boundary between the Pennsylvanian and Mississippian formations and in the north-central part in La Salle County adjacent to the boundary between the Pennsylvanian and Ordovician formations. These boundaries are shown on the geologic map of the State[1] and approxi-

[1]The latest edition was published by the Illinois State Geological Survey in 1914.

FIG. 4.—Map showing approximate outcrop of the Cheltenham clay in Illinois.

mately also on the map (fig. 4) accompanying this paper. South of Madison County the basal portion of the "Coal Measures" is greatly thickened by beds of coal, shale, and sandstone that are not present to the north, and the clays are not refractory.

In a previous publication of the Survey[2] David White has presented paleobotanical evidence to show that although the coal itself is not present in most of the area in which the clays are being exploited, the stratigraphic position of the fire clays is immediately below the horizon of coal No. 1 of Rock Island County. In the summer of 1909 the writer in connection with the collection of representative samples of this fire clay studied the stratigraphic environment of these clays with the object of establishing the correlation on a lithologic basis. The studies were begun in the southern portion of the field and carried northward. From Madison to Brown counties, inclusive, the sections presented marked uniformity, but north of this area the sections were modified to such an extent that in some places correlations that are not verified by fossil evidence are doubtful. A general section for the region is somewhat as follows:

General section showing fire-clay horizon

	Description of strata	Thickness *Feet*
8.	Shale	30
7.	Coal No. 2	2½
6.	Clay	5
5.	Limestone (south of Colchester)	4
4.	Shale and sandstone (north of Colchester)	25
3.	Coal No. 1 (Rock Island County and locally)	2
2.	Fire clay	8
1.	Coarse sandstone	10
	Mississippian limestone, St. Peter sandstone, or Platteville ? limestone	..

The sections in figure 5, most of which are at points where the clay is exploited, illustrate the prominent features of the stratigraphy from Madison to Rock Island counties. For comparison two sections from the Cheltenham district, St. Louis, are also shown.

In the region of greatest exploitation, or south of Macomb, coal No. 2 is at most places from 2 to 2½ feet thick. Below it is a plastic, 5-foot clay that is nearly everywhere of no value for ceramic purposes. Below this clay is a limestone that occurs at Colchester, Ray (?), Ripley, Exeter, Alsey, North and East Alton, Golden Eagle, and Cantine, and also in St. Louis. In the vicinity of Alton the limestone has a dense, gray matrix containing darker gray subcrystalline inclusions, varying in size from minute fragments

[2]White, David, Report on field work done in 1907: Ill. State Geol. Survey Bull. 8, pp. 268-272, 1907.

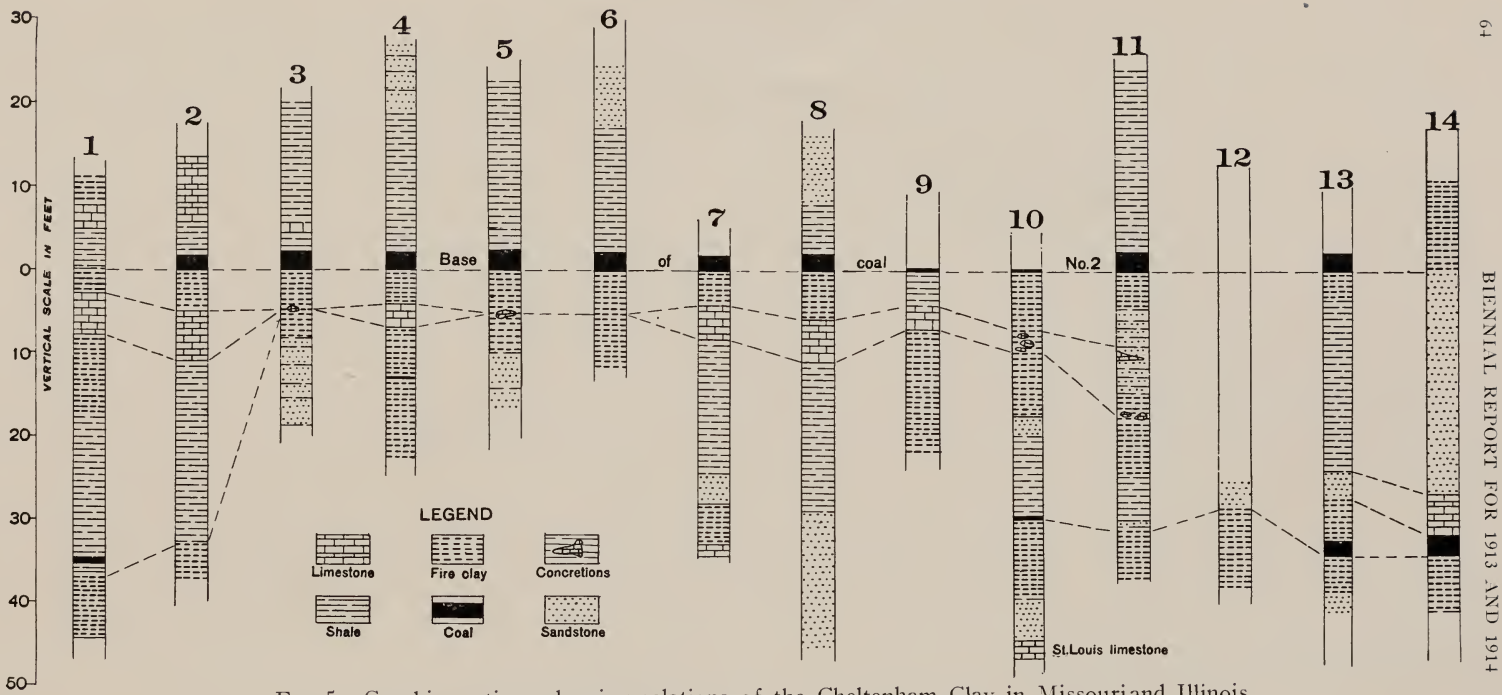


FIG. 5.—Graphic sections showing relations of the Cheltenham Clay in Missouri and Illinois.

1. Evans & Howard, St. Louis, Mo.
2. Parker Russell, St. Louis, Mo.
3. Hydraulic Press Brick Co., Cantine, Madison Co.
4. Alton Paving, Building, and Fire Brick Co., North Alton, Madison Co.
5. Golden Eagle, Calhoun County
6. White Hall, Greene County
7. Alsey, Scott County
8. Ripley, Brown County
9. Ray, Schuyler County
10. Colchester, McDonough County
11. King clay pit, Colchester, McDonough County
12. Macomb, McDonough County
13. Monmouth, Warren County
14. Griffin, Mercer County

to pieces several inches in diameter. A fresh fracture shows no difference in structure between matrix and inclusions, but the inclusions are most resistant to weathering, so that in outcropping rocks these inclusions stand out in relief. The limestone in this vicinity occurs as a bed about 3 feet thick. This limestone at Exeter, Alsey, and probably at Ripley, is of the same character as that at Alton. At Golden Eagle, however, the limestone below the coal occurs in lenses or boulders, is light gray in color, and possesses a granular to pisolitic concretionary structure. Both the lenses and boulders present a pisolitic surface and imbedded in some of the boulders are numerous crystals of pyrite. The position of these lenses suggests deposition contemporaneous with the brecciated limestone at Alton and elsewhere, but the differences in the character of the limestone indicate that the conditions at least of deposition were different. The writer did not succeed in finding any of the boulders "in place", but at Cantine they were reported to occur in the clay above the limestone bed. These boulders have a high iron content and in some of them the iron content predominates to such an extent that they approximate the composition of "kidney" iron ore. The iron boulders also present the same pisolitic surfaces possessed by the limestone boulders. An occasional ore boulder, but none of the limestone boulders, was found in the Cheltenham district of St. Louis. However, some limestone boulders were found thrown out of a test pit at the St. Louis Portland Cement Company north of the city. Conditions here appear to be similar to those at Golden Eagle. The limestone in the section at Ray is similar to that south, except that the matrix is light brownish gray instead of nearly as dark as the inclusions. The coal here corresponds to Worthen's coal No. 3 of Schuyler County, but it is probably No. 2.

In the vicinity of Colchester the limestone below coal No. 2 appears as lenses or boulders. The limestone here presents a brecciated appearance produced apparently by calcite-filled fractures in an originally homogeneous rock. The boulders also contain numerous cavities wholly or partly filled with calcite crystals. The limestone is separated from the underclay of coal No. 2 by a few feet of shale. At Golden Eagle, North and East Alton, Cantine, and Ripley, the fire clay lies immediately below the limestone, but here 20 feet of clay, sandstone, and shale with a local development of coal No. 1 intervenes. Coal No. 1 where present lies immediately above the fire clay and reaches a maximum thickness of 2 feet.

In the vicinity of White Hall and Drake, no limestone is present. Much of coal No. 2 has been eroded from this region, but where present, as in part of the pit of the White Hall Stoneware and Sewer Pipe Company, there is no underlying limestone. At Macomb both coal and limestone are absent. The fire clay in the Macomb Illinois Clay Products Company's pit occurs below two feet of highly carbonaceous clay which possibly marks the horizon of coal No. 1. Above the carbonaceous clay is three feet of massive

gray sandstone. At Monmouth in the mine of the Monmouth Mining and Manufacturing Company, the fire clay lies 30 feet below coal No. 2, and a local development of coal No. 1 (?) occurs in the midst of the clay.

At Carbon Cliff the fire clay lies immediately below coal No. 1 and black limestone above. Coal No. 1 capped by a similar black limestone also overlies the clay south of Utica. The clay here lies unconformably upon patches of Platteville (?) limestone or the irregular surfaces of St. Peter sandstone. At Ottawa, the clay is overlain by coal No. 2 (?) and 10 feet of gray shale, and underlain by St. Peter sandstone.

The fire clay where exploited ranges from 5 to 20 feet in thickness with an average of 8 feet. It ranges in color from black to light gray where the overlying rocks have not been disturbed, but near White Hall and Drake, where the coal has been eroded, it is nearly white. The whitish clay is in most places mottled to some extent with blotches of Indian red. In a local deposit at Drake this color permeates the whole mass and causes the clay to burn red. It seems probable that the red portions are reworked from a bed of shale of this same color which shows in outcrop below the clay pits at Drake. At all localities the clay contains considerable quantities of iron as small crystals of pyrite scattered through the bed. It is segregated to a considerable extent, however, usually in bands near the top. Gypsum crystals also are usually to be observed on exposed surfaces.

The clay in most places rests upon the irregular surface of the coarse gray sandstone that forms the basal member of the Pennsylvania formation but may be separated from it by a foot or two of shale. At one or two points there is a local development of coal between the fire clay and the sandstones.

COUNTY REPORTS

Madison County

The outcrop of the fire clay in Madison County extends from a point on the county line north of Godfrey southerly and easterly to East Alton. South of East Alton it is cut off by the alluvium of the Mississippi River bottom. Fire clay is found, however, two miles east of Collinsville at Cantine at a depth of 270 feet, and it seems probable in view of the extensive development of fire clay from this horizon in the St. Louis district, that the clay extends entirely across the county.

At Cantine the clay, including both that above and below the limestone, is from 10 to 14 feet thick. The clay above the limestone is used for buff brick, and that below for gray brick. At East Alton, at the sewer-pipe plant, the clay below the limestone is 7 feet thick, and in a test pit and boring in the yard of the Alton Paving Brick and Fire Brick Company, at North Alton, the clay below the limestone was more than 20 feet thick. This thickness is exceptional and probably extends over only a limited area.

Jersey County

In Jersey County the fire-clay horizon outcrops in the eastern half of the county, but the beds in this region appear shaly or sandy. No outcrops were found that looked sufficiently favorable to warrant sampling.

Calhoun County

At the southern end of Calhoun County, at Golden Eagle, the clay is used in the manufacture of fire brick. Coal No. 2, which lies immediately above the clay, is mined with it. The clay is reported to be 10 feet or more in thickness, but only 5 or 6 feet is mined, all of which lies above the limestone. This is the only place where the clay over the limestone is used in preference to that below. At every point north of here the clay between coal No. 2 and the limestone is too poor in quality to be used. The area underlain by this clay in the southern end of Calhoun County is probably about one square mile, but prospecting has not revealed its quality elsewhere than at Golden Eagle.

Greene County

Prospecting north and south of Carrollton in Greene County failed to reveal any promising outcrops of fire clay, although one sample of doubtful quality was taken from an exposure about 4 miles east of Carrollton. In the vicinity of White Hall and Drake, however, are extensive deposits. In this region no limestone is present either in or over the clay, and over much of the area the coal also is absent. The limestone is not present probably because it was not deposited, but the coal is absent because it has been eroded. In the pit of the White Hall Stoneware and Sewer Pipe Company, this is clearly illustrated by the sudden replacement of the coal and shale above the fire clay by yellow basal clay.

The location of the pits from which the White Hall plants now obtain their clay is about two miles east of the town. It is reported, however, that good deposits extending another mile east are available when the present plants are worked out. The dip of the rocks here is easterly, and nothing is known of the clay after it gets below drainage, but it is possible that shafts would reach the clay over a larger area. The clay in the pits is from 10 to 20 feet thick. Where it is under cover of the coal it is dark gray, but where it is covered only by drift, it is nearly white, except for patches of Indian red in the lower portion and the yellow iron stain in the upper more weathered portion. The yellow clay and the clay below the coal is used in the manufacture of sewer pipe, and the whitest clay is used for stoneware.

One of the pits at Drake is a quarter of a mile southeast of the station and the other about an eighth of a mile south. No coal is present above the clay at either point. At the former about 15 feet of gray clay is exposed, the lower half of which is streaked with white apparently along bedding

planes. A shale structure, however, is not developed. In the pit nearer the station the clay rests upon an irregular sandy floor and has also an uneven upper surface, so that the thickness of the clay is constantly changing, the range being between 5 and 20 feet. The clay in this bed resembles in appearance the light-colored clay of White Hall. In a nearby abandoned pit, the Indian red color that appears locally elsewhere, permeates the whole mass. This clay burns red and has been used in terra cotta manufacture. For a mile in either direction from Drake along the railroad, the fire clay may be found outcropping in the ravines. No clay has been reported between Drake and the pits west of White Hall, but it may be that this is due to its covering rather than that it is absent. The outcrops should extend from two miles east of White Hall in a northward course through Roodhouse, thence westward to Drake. On Birch Creek, which is about 3 miles east of Roodhouse, the horizon of the fire clay is approximately at drainage level for several miles. The fire clay from Drake probably has been more widely distributed than that from any other point in the State. Besides being shipped to various points in Illinois, it has found markets in Missouri, Kansas, and Kentucky.

Scott County

In Scott County the outcrop of the fire clay extends approximately through Alsey, Winchester, and Exeter. At Alsey the clay is mined from a shaft at a depth of 80 feet. The clay here is reported to be 15 feet thick, but only 6 or 7 feet are removed at present. It is used in the manufacture of building brick. The bricks are buff mottled with black. The mottling is produced by the melting of pyrite crystals which appear abundantly in the upper portion of the clay. The nearest point at which the clay outcrops is on a branch of Little Sandy Creek about 2 miles northeast of Alsey. Just below the limestone at this outcrop, which reveals only about 4 feet of clay, numerous gypsum crystals appear on the surface.

One mile east of Winchester the fire clay outcrops on Big Sandy Creek. No clay is taken from here now, but formerly it was dug for use in the stoneware pottery at Winchester. Only the upper, more weathered portions of the clay were used, as the bottom is below drainage.

One-half mile west of Exeter the clay outcrops in the bluffs of Mauvais Terre Creek. At one point in the bluff, clay was at one time dug and used at a pottery in Merritt, but not all the clay in this vicinity could be used for that purpose, but at an outcrop a few hundred yards east of the place where clay was formerly dug, the clay is extremely sandy.

Morgan County

The horizon of the fire clay in Morgan County lies in the bluffs of Illinois River, but the bluffs are so covered with loess that there are few or no exposures of clay. None was observed.

Pike County

In Pike County, Pennsylvanian rocks underlie only township 4 north, range 4 west, and parts of the surrounding townships. Coal and clay occur a short distance above the Mississippian rocks, but it is uncertain from the lithologic evidence whether or not they are the No. 2 coal and underlying fire clay. No limestone appears in this section, whereas sections in Scott and Brown counties indicate that to the north and east limestone occurs persistently between the coal and clay. A composite bluff and roadside section about two miles northwest of Maysville reveals the following:

Section two miles northwest of Maysville

		Thickness *Feet*
11.	Clay shale	1+
10.	Fissile shale, black	6
9.	Coal	1
8.	Clay, much weathered	5
7.	Clay and shale, light gray, partly concealed	15
6.	Sandstone, yellowish gray	1
5.	Fissile shale, blue gray	6
4.	Clay shale, drab	5
3.	Sandstone, soft, light gray	5
2.	Clay shale, soft, light gray	1
1.	Whitish chert (Mississippian)	1+

So far as known to the writer, no fire clay has been exploited in Pike County, excepting possibly a small local outlying deposit about two miles south of Pittsfield which is reported to have furnished clay for a pottery formerly operated at Pittsfield.

Brown County

In Brown County the valleys of McKees and Crooked creeks cut below the horizon of the fire clay causing the outcrop to run parallel to these streams. No refractory clay is known to outcrop on McKees Creek, but on Crooked Creek in the vicinity of Ripley, clay has been used for many years and formerly quite extensively for stoneware. Since Ripley is ten miles from the nearest railroad station the trade is local.

Adams County

In Adams County, Pennsylvanian rocks underlie most of the townships in the two eastern tiers, but the conditions here are similar to those in Pike County, and no exploitation of fire clay has been undertaken. At one point on Bear Creek, about five miles northwest of Camp Point, a sample of clay for testing was taken from an exposure that is referred doubtfully to the fire clay horizon.

Schuyler County

Pennsylvanian-Mississippian contact parallels Crooked Creek in Schuyler County, but so far as known to the writer no fire clay has been exploited here. On Sugar Creek there is an outcrop that appears from the character of the section and the altitude of the coal to be in the fire-clay horizon, and although the clay is used only for the manufacture of draintile, the lower portion of the bed is classed in the preliminary tests as fire clay. It does not appear to be in the stoneware grade, but might make sewer pipe.

Hancock County

Pennsylvanian rocks occupy the extreme southeast corner of Hancock County south of a line between Stillwell and Plymouth. No prospecting has been done for fire clay outcrops, but the following section measured by Jon Udden of the Survey indicates the succession of rocks at one of the exposures.

Section on Williams Creek in SW. ¼ sec. 26, T. 3 N., R. 5 W.

		Thickness *Feet*
7.	Sandstone, medium-grained, whitish, micaceous, containing concretions of iron carbonate	10
6.	Fissile shale, hard, black, sandy in places	3½
5.	Limestone, nodular, argillaceous, contains numerous calcite fillings	1
4.	Shale, fine grained, containing plant and animal remains	24
3.	Coal No. 1 (?)	2½
2.	Clay, gray, weathering white	5
1.	Argillaceous limestone or in places sandstone	2

This section would look more promising for fire clay if the argillaceous limestone (No. 1 in the section) were absent. Otherwise the section resembles some of those from the vicinity of Colchester.

McDonough County

The line of outcrop of the clay in McDonough County extends along the bluffs and ravines of the east fork of Crooked Creek from Bardolph to the county line on the north side and Tennessee on the south side, whence it extends southeast toward Schuyler County. The extent of known deposits of fire clay of good quality in this county is equalled only by Greene County. The clay is now being dug extensively in the vicinity of Colchester and in a pit about 4 miles northeast of Macomb. At the latter place the clay is about 8 feet thick and is used in the manufacture of sewer pipe at Macomb. Clay has been dug more or less extensively on the north side of Crooked Creek from opposite Macomb nearly to Bardolph, but no clay has been found on the south side. Although the clay taken up to the present time has been from open pits, the cover is heavy so that stripping is expensive.

At Colchester the clay is mined from drifts and shipped to Monmouth and Macomb for stoneware. Not all the mines in this vicinity are operated continuously, but there are usually four or five in operation within two miles of Colchester. The clay here is from 7 to 10 feet thick. About one mile north of Tennessee, in the south bluff of Crooked Creek, clay was sampled from a mine that was not in operation when visited. A mile farther north clay sampled from an outcrop on the Lee McClure farm showed the presence of clay on the north side of the creek also.

Fulton County

In Fulton County the Colchester or No. 2 coal is thin or absent, whereas the No. 1 coal is developed to workable thickness. The No. 1 coal outcrops on Spoon River at Seville and Ellisville, but where the writer had opportunity to make examinations sandy and shaly rocks take the place of fire clay. Just north of Avon, however, on Swan Creek, a sample of clay was taken below what was called coal No. 1.

Warren County

Under most of Warren County the fire clay horizon lies below drainage. The line of contact between the Pennsylvanian and Missisippian rocks passes a little west of Smithshire, Monmouth, and Gerlaw. The area north and west of this line is occupied by Mississippian rocks. Exploitation of fire clay in this county is confined to the vicinity of Monmouth. The clay is mined just east of Monmouth where it is used in the manufacture of sewer pipe. The 10-foot bed is not homogeneous, the clay representing three or four grades of clay. A mile north of town, clay from probably the same horizon but inferior in quality is dug from an open pit and used in the manufacture of fireproofing. A limited amount of prospecting did not reveal any further deposits. The indications do not suggest valuable deposits in this county since the best that is exploited at present is inferior to that used in McDonough County and south.

Mercer County

Coal No. 1 is below drainage under much of Mercer County, so that the clay under it is seldom seen. Where the clay is exposed by mining the coal, it is usually too sandy to be of value for ceramic purposes. Near Griffin, however, an outcrop of clay at this horizon gave promising results in the preliminary test. Unfortunately lack of time prevented another visit on the second sampling trip. A fire clay deposit two miles northeast of Aledo was sampled also, but this is a thin bed probably not at the same horizon.

Rock Island County

In the southern part of Rock Island County conditions are similar to those in Mercer County, but just north of Rock River clay is dug at Carbon Cliff and at Sears. At Carbon Cliff the clays and shales appear to lie immediately below coal No. 1 and total 25 feet in thickness. The fire clay is used in the manufacture of dry-press and soft-mud fire brick and the clay in the manufacture of draintile. At Sears the clay and shale is 20 feet thick and is used in the manufacture of fire brick. Here the clay underlies 5 feet of white sandstone. The outcrop of coal No. 1 could not be seen at the time of the writer's visit, but the indications were that the coal lies a short distance above the sandstone. At Illinois City also fire clay has been taken from immediately below a similar sandstone ledge, at probably the same horizon. The clay has been taken to Muscatine, Iowa, for sewer-pipe manufacture. This clay outcrops on a number of farms in this vicinity, and although the Survey has not had an opportunity to sample this clay, the fact that intermittently for a number of years it has been hauled about 8 miles by wagon to Muscatine, Iowa, indicates that the clay is of good quality.

La Salle County

The only places along the outcrop line of the Pennsylvanian rocks east of Rock Island County at which fire clay is exploited are in La Salle County. Coal No. 1 outcrops from the bluffs of Illinois River between the Big and Little Vermilion rivers, and Fox River, and for several miles up the latter streams. The clay below this coal is now being used five miles south of Utica, near Lowell and just east of Ottawa.

There are two pits open at present south of Utica. In one the clay is about 10 feet thick and overlain by coal No. 1, and in the other the clay is covered only by a foot or two of soil. The former furnishes a hard gray clay used in making fire brick, and the latter a whiter, more plastic, less refractory clay. These pits are above the Illinois River bluffs on the crest of the La Salle anticline. Although only the clay that has been dug into is visible, the topography of the land and the structure of the rocks indicate that in sections 21 and 22 of Deer Park Township, there should be an area one-half mile wide and at least one mile long over which this fire clay should lie under light cover.

At Lowell an outcrop of fire clay on the bluffs of the Big Vermilion River is used in the manufacture of stoneware in a local plant. The deposits east of Ottawa are used in connection with Missouri flint clay in the manufacture of fire brick. The clay here averages 6 feet in thickness and lies immediately below coal No. 2 (?). The coal is 2 feet thick and overlain by 2 feet of shale. The clay here, as south of Utica, underlies a broad flat which in this case is at the base of the bluffs instead of the summit, and

extends several miles east from the pits. The fire-clay horizon extends above drainage up Fox River as far as the ravines 2 miles north of Dayton and also several miles west of Ottawa in the bluffs of Illinois River.

In mines in both La Salle and Grundy counties clay below coal No. 2, known commercially as the "Third Vein," possesses refractory qualities. Clay from this horizon is taken up by the Illinois Zinc Company from their Deer Park mine for their own use as a refractory.

Grundy County

In Grundy County the clay below coal No. 2, or "Third Vein", coal is shipped from the mines of the Big Four Wilmington Coal Company as a ground fire clay, and from the Wilmington Star Mining Company for cupola clay.

GEOLOGY AND ECONOMIC RESOURCES OF COLCHESTER AND MACOMB QUADRANGLES

By Henry Hinds

(U. S. Geological Survey in cooperation with Illinois State Geological Survey)

OUTLINE

OUTLINE—*(concluded)*

ILLUSTRATIONS

TABLES

INTRODUCTION

Location and Importance of the Area

The Colchester and Macomb quadrangles lie in west-central Illinois between latitudes 90° 30′ W. and 91° W. and longitudes 40° 15′ N. and 40° 30′ N., an area of approximately 455 square miles. In this territory are included nearly all southern McDonough County, a strip 5 miles wide on the east edge of Hancock County, and a strip 2 miles wide on the north edge of Schuyler County. This region was surveyed topographically in 1911 and 1912 and geologically in 1912 by the State and Federal surveys acting in cooperation.

The two quadrangles embrace a large acreage of very fertile farm land and to this factor may be ascribed by far the greater part of the very evident prosperity of the inhabitants. The Chicago and Kansas City Branch of the Chicago, Burlington and Quincy Railroad traverses the region from northeast to southwest and the St. Louis and Rock Island Branch of the same system is only a short distance east of the Macomb quadrangle. The northwestern corner of the Colchester quadrangle and the southern half of the Macomb are not so well supplied with transportation facilities as are most parts of the State, but the resumption of operations on the recently constructed Macomb and Western Illinois Railroad from Macomb through Industry to Littleton will remedy this condition to a large extent. The principal town in the region is Macomb, with a population of 5,774 in 1910.

It is the county seat of McDonough County and an important educational and industrial center. Colchester with 1,445 inhabitants, Plymouth with 829 and Industry with 580 rank next in importance. Bardolph, Tennessee, and Fountain Green contain between 150 and 400 people, and Colmar, Fandon, Birmingham, St. Marys, Pennington Point, and Joetta less than 150. Augusta, a town nearly as large as Colchester, is less than a mile south of the Colchester quadrangle, while Adair lies just beyond the eastern limit and Littleton just beyond the southern limit of the Macomb quadrangle.

Soon after the completion of the railroad in 1855, commercial coal mining was actively prosecuted at and near Colchester, coal being shipped to Quincy and other points in western Illinois. Not long after the close of the Civil War the Colchester output reached half a million tons or more per annum. During the last 30 years the competition of fields containing thicker coal beds has caused the production to decline until that of all McDonough County was only 23,999 tons in the year ending June 30, 1911. The increase in clay mining and the manufacture of clay products at Colchester and Macomb has, however, compensated the decrease in coal mining, so that today the region is best known as one of the principal clay centers of the State.

Acknowledgments

A brief description of the geology and economic resources of Hancock County was published by A. H. Worthen in 1866, of Schuyler County in 1870, and of McDonough County in 1873.[1] A general report on the glacial deposits and topographic features of this part of Illinois was made by Leverett[2]. Earlier geologists did not visit all parts of the quadrangles, however, and no detailed work with adequate maps was attempted. The present geologic work has been under the immediate supervision of David White, whose paleobotanic investigations, briefly summarized in the yearbooks of this Survey, have made possible the definite correlation of the coal and clay beds mined near Colchester with contemporaneous deposits in other parts of the State and country. G. S. Rogers assisted in the Macomb quadrangle for three weeks. Stuart Weller and E. W. Shaw visited parts of the region with the writer, the former assisting in correlating Mississippian exposures and the latter in Pleistocene problems. Farmers, miners and well drillers were uniformly courteous and freely extended all the information in their possession.

[1]Illinois Geol. Survey, vols. 1, 4, and 5, respectively.

[2]Leverett, Frank, Illinois glacial lobe: U. S. Geol. Survey Monograph 38, 1899.

SURFACE RELIEF AND DRAINAGE

The lowest point in the region is where Crooked Creek crosses the south line of the Colchester quadrangle and is about 470 feet above sea level. The highest point is on the prairie 5 miles north of Colchester and has an altitude of about 730 feet, making the maximum vertical range of surface relief 260 feet.

The greater part of the Macomb quadrangle is an almost flat prairie having an average altitude of 660 to 680 feet, although there are a few narrow valleys 130 feet or less in depth. Low swells or ridges that would be inconspicuous in a less level region rise a few feet above the 700-foot contour. The northwest, southwest, and southeast corners contain a network of valleys with narrow divides, making a more rugged topography than in surrounding regions. Any part of this quadrangle can be easily reached by spurs from railroads already constructed.

The Colchester quadrangle exhibits a greater range of altitudes than the Macomb and is broken by a greater number of valleys. The upland prairie on the north side of the area averages nearly 700 feet above sea level, that near Colchester and Tennessee about 680 feet, near Fandon 660, and near Plymouth 640. The gently rolling country west of St. Marys has an altitude of less than 625 feet and, in general, the upland prairies become gradually lower as they near Crooked Creek. All of the main creeks have very narrow alluvial flood plains, but that of Crooked Creek is nearly a mile wide. Much of the northern part of the quadrangle is separated from the railroad by the deep, narrow valley of the East Fork of Crooked Creek, and could not be easily reached by short spurs of existing railways.

Most of the region is well drained, though tiling is necessary on many of the high prairies, especially those of the eastern part of the Macomb quadrangle. Nearly all the drainage is tributary to Crooked Creek, which traverses the Colchester quadrangle from northwest to southeast and joins Illinois River below Beardstown. This meandering stream falls a distance of 50 feet within the limits of the quadrangle. The gradient of the flood plain is 2.4 feet per mile, but the actual gradient of the stream, measured so as to include its many windings, is only 1.7 feet. During the dry summer season the water flows very sluggishly and is practically stagnant in many places. Its principal tributaries from the east are East Fork, Troublesome Creek, Camp and Grindstone creeks, and Willow Creek. From the west it receives Brunces and Flower creeks. The drainage of the southeastern corner of the Macomb quadrangle is tributary to Sugar Creek, a stream that joins the Illinois River about 5 miles above Beardstown.

The altitude of all points on the surface and the exact location of all railroads, public roads, and houses will be shown on the topographic maps of the two quadrangles, now being prepared for publication.

GENERAL GEOLOGY

Stratigraphy

GENERAL STATEMENT

The thick cover of loose surface materials conceals in many parts of the region the regularly bedded, indurated rocks beneath them. Scattered outcrops of the older deposits are fairly numerous, however, in the northwestern, southwestern and south-central districts of the Macomb quadrangle and in most of the deeper valleys in all parts of the Colchester quadrangle except near Troublesome and Spring creeks. Exposures are particularly good on nearly all of East Fork drainage, on Grindstone Creek below Industry, on Willow Creek, on the upper parts of the West Branch of Sugar Creek, and near Plymouth.

SURFACE DEPOSITS

The unconsolidated surface deposits are of four types: (1) glacial till consisting of yellow and blue clay bearing many pebbles and small boulders and containing pockets of sand, (2) loess, a fine-grained yellow, buff or gray deposit of sandy clay lying as a mantle on the valley sides and covering the uplands to a depth of 5 to 20 feet, (3) orange to white sand lying at or near the base of the till and 100 feet and less thick, and (4) alluvial clays that have accumulated to form the flood plains of the main creeks.

So far as the greater part of the economic resources are concerned the differentiation of these types is of less significance than the depth to which they extend. Before the advent of glacial ice caps thousands of years ago this region contained divides and valleys much like those of the present day, but the valleys were deeper, the divides narrower, and there were few level plains like the present prairies. The valleys of that time, however, did not correspond in position with those of today and in many cases traversed areas that are now almost unbroken upland prairies. Most of these valleys and the adjacent areas were topographically so low that all or most of the coal and stoneware clay had been removed by erosion, just as they have been washed away by the main streams now existing. When the ice crept over the region from the north, it brought with it great quantities of ground rock flour, pebbles and boulders. When the ice melted and withdrew, it left so much of these materials that they completely filled and obliterated the old valleys and spread over the divides, forming a new surface that was nearly level and on which new drainage lines were gradually developed.

In the districts where coal No. 2 (Murphysboro coal) still remains the thickness of the surface deposits averages only about 40 feet. Where there were pre-glacial channels, however, it is much greater. Thus Spring Creek has failed to cut through to the consolidated strata except near its mouth, and Troublesome Creek, even where it lies more than 100 feet below neigh-

boring divides, has exposures of older rocks only at a few points about 3 miles above its mouth. Near Fandon it is 70 to 150 feet to the solid rock, west of St. Marys 40 to 95 feet, near Fountain Green 150 feet and less, southeast and northeast of Industry 40 to 170 feet and southwest of Macomb about 100 feet. In the northeastern quarter of the Macomb quadrangle few wells reach the consolidated strata, though a number are more than 100 feet deep.

HARD ROCKS

Below the unconsolidated surface deposits there are older, regularly stratified strata exposed in many of the valleys which are reached by the deep wells at Macomb and near Birmingham. These deep drillings confirm the well-established geological principle that there are no commercial coal beds in strata lying below the Pennsylvanian series. In this discussion only beds outcropping at the surface will be mentioned, the oldest and lowest being taken up first. All these strata are included in two major divisions, the Mississippian series at the base and the Pennsylvanian at the top.

MISSISSIPPIAN SERIES

Mississippian rocks outcrop in all the valleys of the Colchester quadrangle in which the hard or indurated rocks are exposed and along Camp and Grindstone creeks near the western boundary of the Macomb quadrangle. In much of the region, however, they are not the first indurated rocks encountered in sinking wells on the upland, for the basal Pennsylvanian beds overlie them in the greater part of the region.

The oldest Mississippian rocks exposed belong to the Keokuk limestone and consist chiefly of light to bluish-gray crystalline limestone in thin regularly stratified beds. This limestone contains great numbers of fossil shells and irregularly distributed seams and lenses of chert or flint. There is 100 feet of this limestone exposed two or three miles northeast of Plymouth, though only the upper part can be seen along Brunce's Creek and at intervals along Crooked Creek and the lower parts of many tributaries as far south as Birmingham.

Above this crystalline limestone is about 50 feet of blue to drab shales intercalated with thin beds of impure limestone. The lower third consists of blue shale, in places so calcareous as to be a homogeneous earthy limestone, containing many geodes from the size of a marble to that of a football. Many of the geodes are hollow, and the interior is lined with beautiful crystals of quartz, calcite, and other minerals. Since geodes do not occur in the Pennsylvanian, they serve to differentiate the shales in which they lie from very similar beds in the higher series. These abundantly geodiferous beds compose the upper member of the Keokuk limestone. Above the Keokuk limestone are shales, two or three thin, brownish drab, impure limestones, and in places, one bed of more crystalline limestone containing

many lace-like bryozoans and other fossils. At the top of the 50-foot interval mentioned there is a persistent bed of limestone, 1 to 25 feet thick, that is so sandy in places as to resemble strongly a sandstone near the base of the Pennsylvanian.

The uppermost formation of the Mississippian is the St. Louis limestone, a stratum that has certain peculiarities by which it may be easily identified. As it marks, where present, the lower limit of coal and stoneware clay, its detection by the driller and prospector is of considerable economic importance. The St. Louis is light blue to brown, dense, very fine grained and possesses a more or less conchoidal fracture. In this region it is 25 feet or less thick and, except for a layer one or two feet thick at the base, is brecciated throughout. This brecciation is a striking characteristic, giving to the formation the appearance of having been

FIG. 6.—Brecciated St. Louis limestone.

broken into angular and subangular blocks and afterward very firmly cemented. The St. Louis may be seen beneath the clays mined at Colchester and at many other places in the Colchester quadrangle.

PENNSYLVANIAN SERIES

Pottsville formation.—The strata from the base of coal No. 2, mined at Colchester and elsewhere, to the top of the Mississippian are included in the Pottsville formation. The first and lowest deposit laid down was a coarse-grained sandstone composed of almost pure translucent quartz grains in a slightly ferruginous cement and known locally as a "glass sand". Since the bed occupies the depressions in the old Mississippian land surface, its thickness is variable. It is the only Pennsylvanian bed exposed in most of the west half and southeast quarter of the Colchester quadrangle. Pottsville strata are somewhat variable in character, though sufficiently persistent

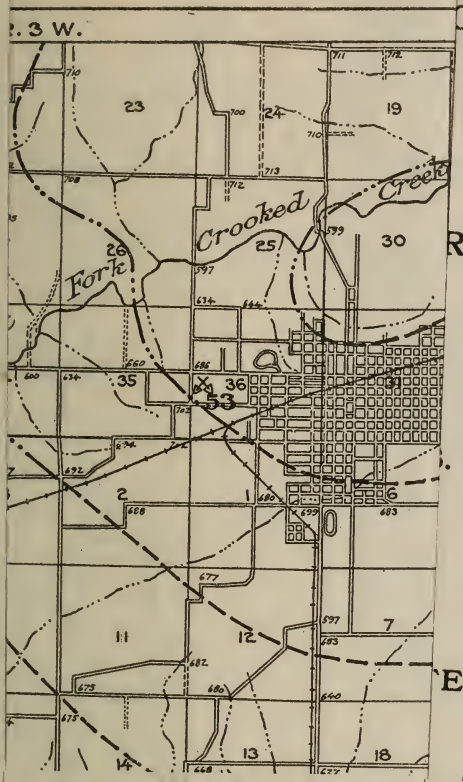
to be recognized and differentiated by careful study in any part of the field. The following section measured near Colchester is typical.

Typical section of the Pottsville formation

	Thickness *Feet*	Distance below Murphysboro coal *Feet*
Pottsville formation—		
Clay, drab to white	4	4
Shale, including layers of red sandstone in places	8	12
Limestone, dark blue to bluish gray, nodular, weathers to a knobby surface, in some places a ledge, but in others only scattered boulders	2	14
Clay and shale	6	20
Sandstone, yellow, thicker in places	2	22
Shale, variegated	7	29
Clay, variegated, very sandy in part, carbonaceous streaks near bottom, horizon of stoneware clay	8	37
Sandstone, weathers buff or with black coatings, thin bedded to massive, quartzose, thickness variable	7	44
Shale, bluish black, with small lenses of clay ironstone, absent in places	4	48
St. Louis limestone, brecciated (top of Mississippian)		

The Pottsville is slightly less than its average thickness in the above section. Although no coal is shown here, the formation contains one or more thin coal beds in most parts of the quadrangles. All Pottsville coal beds are usually termed "coal No. 1", although they do not commonly occupy exactly the same stratigraphic horizon in all parts of the region. Most commonly "No. 1" lies either just above or just below the stoneware-clay horizon.

Carbondale formation.—The Carbondale formation includes the strata from the highest indurated rocks of the region to the base of coal No. 2 (Murphysboro coal). At Colchester there is a maximum of about 45 feet of this formation, the lower part being a blue to drab shale that is argillaceous at the base and more sandy at the top, and the upper part being a thin-bedded to massive brownish sandstone with shale partings. The distance from the coal to the sandstone varies from 40 feet in a few places near Colchester to one foot or less in the southern part of the Macomb quadrangle. In the south-central part of the Macomb quadrangle the maximum thickness of the Carbondale for this region is exposed. There are here as much as 90 feet of sandy and argillaceous shale and sandstone. In many places there is massive sandstone on or near the Murphysboro coal, with alternating shale and sandstone beds above it. No trace was found of coal "No. 3", reported by Worthen to lie 30 to 50 feet above coal No. 2 in Schuyler and Fulton counties, and the only representatives of its limestone cap rock are small, thin, calcareous lenses in only three outcrops.



CONOMIC GEOLOGY

OF

R and MACOMB QUADRANGLES

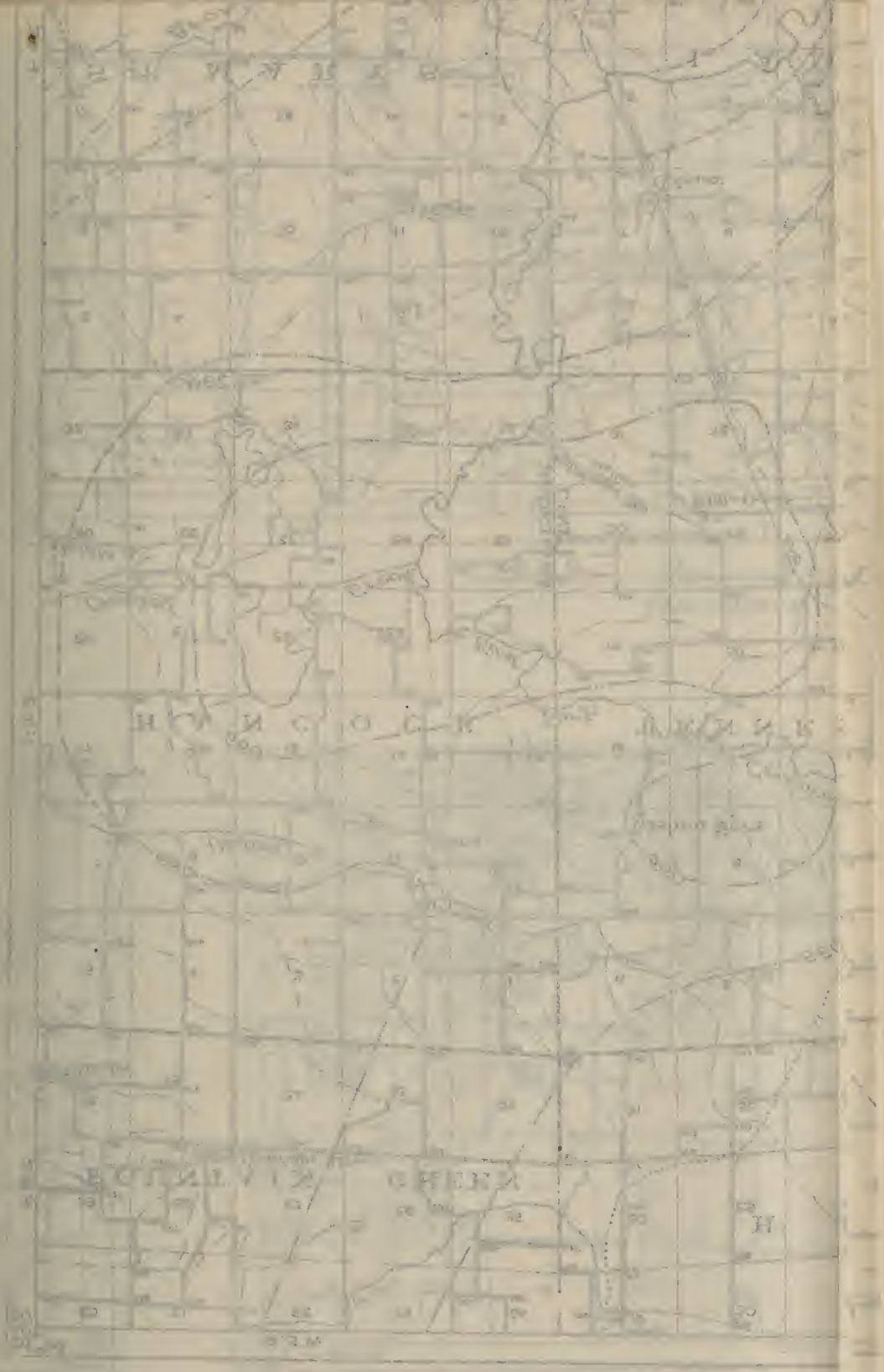
BY HENRY HINDS

. GEOLOGICAL SURVEY

IN COOPERATION WITH

E GEOLOGICAL SURVEY

(SURVEYED IN 1912)



Structure

On the accompanying map (Pl. II) the elevation of the coal No. 2 (Murphysboro coal) above sea level is shown by means of structure contours. Along any given contour the coal is 20 feet higher or lower, as the case may be, than along the next contour, rising more or less uniformly from one to the other. These contours are based upon hundreds of outcrop observations and on shafts and well records. In much of the region the coal was eroded away either before or after the glacial drift was deposited, a fact that is indicated by an appropriate contour symbol. In these areas the former altitude of the coal is calculated on the assumption that the vertical distance from the base of the St. Louis limestone to the Murphysboro coal bed is 75 feet and from the top of the crystalline limestone beds of the Keokuk to the coal is 125 feet. In the northeastern quarter of the Macomb quadrangle, in the territory between East Fork and Camp Creek drainages on the same map, and on the prairies near Fandon, Colmar, St. Marys, Fountain Green and northeast of Industry there are no outcrops or well records that reveal the exact position of the coal, but it is not believed that the altitudes indicated are more than 20 or 30 feet in error. These doubtful areas are also indicated by an appropriate symbol.

On the final maps the structure contours will be accompanied by surface contours, so that the depth to the coal horizon may be readily calculated for any tract of land. To facilitate the practical use of the maps accompanying this report, surface altitudes are shown at cross roads and other places. The horizon of the stoneware clay lies 30 to 40 feet below that of the Murphysboro coal, so that its depth may also be determined from the structure maps.

The structure of the region is simple. There is a general easterly dip of a few feet per mile, but this is much modified in two anticlinal areas where the strata have been arched or bowed up to relatively high levels. On one of these, northeast of Plymouth, the horizon of the coal is 720 feet above sea level; in the other, at Macomb, it is 670 feet. In the central part of the Colchester quadrangle the altitude of the coal varies little from 660 feet, and in the southern half of the Macomb quadrangle it is 570 to 600 feet. The level of the coal varies 10 or 15 feet within short distances in certain mines, but rarely dips regularly in a definite direction. There is some rather exceptional structure near Industry, where the coal in old workings close to the Ellis shaft (SW. ¼ NE. ¼ sec. 16, T. 4 N., R. 2 W.) dips 17 feet to the north or northwest in a distance of only 100 yards. Faults are rare, and none of more than 2 feet vertical displacement was seen or reported.

ECONOMIC GEOLOGY

Coal

MINOR COALS

The only coal bed of known economic importance is coal No. 2 (Colchester coal) at the base of the Carbondale formation. There are two or more thin coal beds ("coal No. 1") in the Pottsville formation, but these have in general proved too thin or too impure to be mined at a profit. A little coal has been taken from these Pottsville beds a short distance southwest of Colchester, where they vary irregularly from mere streaks to a maximum of 3 feet in thickness, and from northwest of Macomb (NW. ¼ sec. 25), where the thickness is reported as locally 2 feet. Short drifts have been driven in "No. 1" in the southeastern corner of the Macomb quadrangle (SE. ¼ sec. 4, T. 3 N., R. 1 W.), where the coal was reported 30 inches thick, but on the outcrop shows less than one foot of coal interbedded with carbonaceous shale. "No. 1" is reported 16 to 18 inches thick on East Fork west of Bardolph (NW. ¼ NW. ¼ sec. 22, T. 6 N., R. 2 W.). A coal lying 37 feet below coal No. 2 is said to be 4 feet thick in a well 1½ miles southeast of Industry (NE. ¼ NE. ¼ sec. 23, T. 4 N., R. 2 W.), but thick sandstone immediately above and below it indicates that it may be only a small basin. While there are undoubtedly a few restricted areas in which "No. 1" is workable, Pottsville coals can not be considered an important resource.

No trace of coal beds higher than coal No. 2 was found in outcrops, and it is evident that the bed termed "No. 3" by Worthen and considered by him to lie about 30 to 60 feet above No. 2 in Schuyler and Fulton counties is not present in by far the greater part of this region. It is possible that a 2-foot bed reported 30 feet below the surface in a well one mile southwest of Adair is "No. 3" and that this bed underlies very small areas along the eastern edge of the Macomb quadrangle.

COAL NO. 2

Coal No. 2 (Murphysboro coal) underlies two main areas and several smaller ones. The best known area surrounds Colchester, the coal underlying the town and being cut off within about one mile east, south, and west by glacial drift. The coal has been removed from the valley of the East Fork of Crooked Creek but outcrops on the north side of the stream. As well as can be judged from the few wells that are sufficiently deep to reach the horizon of coal No. 2, the coal area stretches northwest and north to the boundaries of the quadrangle. In the area mapped as coal land are doubtless some tracts from which the coal has been removed by pre-glacial erosion, but outside the area there may be small patches of coal isolated and surrounded by deep deposits of glacial drift. Numerous wells on the

prairies and cuts made by streams have shown, however, that there can be very little additional coal land in the Colchester quadrangle.

The second main coal area includes the southwestern and south-central parts of the Macomb quadrangle, the coal being exposed along Grindstone and Willow creeks, Horney Branch, and the upper part of the West Branch of Sugar Creek. This constitutes an important coal reserve that has scarcely been touched. In the part of the Macomb quadrangle lying north of this area only small patches of coal have been found. One of these lies one mile northwest of Industry, where there are small mines. There are also several patches along Camp Creek drainage, although the cover of indurated rock above the coal is very thin at all of the outcrops and the coal is, consequently, of doubtful value. These outcrops were found in the SW. ¼ SW. ¼ sec. 10, N. ½ SE. ¼ sec. 11, N. ½ SE. ¼ and NW. corner sec. 15, T. 4 N., R. 3 W. Coal that extends some distance beyond the limits of the quadrangle outcrops in its extreme southeastern corner. In the SE. ¼ sec. 4 and E. ½ sec. 7, T. 3 N., R. 1 W., west line NW. ¼ sec. 34, T. 4 N., R. 1 W., SW. ¼ and NE. ¼ sec. 6, T. 4 N., R. 2 W., and the NW. ¼ SW. ¼ and NW. ¼ NE. ¼ sec. 1, NE. ¼ sec. 14, and S. ½ SE. ¼ and E. ½ NE. ¼ sec. 15, T. 4 N., R. 3 W., the beds only a few feet below the coal horizon outcrop, but no coal was seen. There still remains some coal, but with little or no solid cover, in the SW. ¼ NE. ¼ sec. 8, T. 3 N., R. 1 W., and the S. ½ sec. 23 and N. ½ sec. 26, T. 6 N., R. 3 W. The old Eddington shaft mine in the SW. ¼ SW. ¼ sec. 32, T. 5 N., R. 2 W. probably worked a small area of coal No. 2, though it may be a bed 20 feet lower.

Although it is possible to ascertain definitely whether or not the coal is present near the streams that have cut below the level of its horizon, it is more difficult to determine the conditions beneath the prairies and near the shallower valleys of the Macomb quadrangle. The evidence derived from the records of several hundred farm wells in this area shows that there is no coal in at least the greater part of it. Three wells reported coal: (1) 24 inches at 90 feet in the NE. ¼ NW. ¼ sec. 21, T. 4 N., R. 1 W., (2) 21 inches at 40 feet in the NE. ¼ NE. ¼ sec. 23, T. 4 N., R. 2 W., (3) 24 inches at 30 feet in the NE. ¼ SE. ¼ sec. 21, T. 5 N., R. 1 W. Many wells are too shallow to have reached the horizon of coal No. 2. Those in which glacial drift extends below the estimated altitude of the coal, showing that the latter has probably been removed by pre-glacial erosion, are shown in the accompanying table.

TABLE 30.—*Drill holes in which coal No. 2 is absent because of erosion before the glacial drift was deposited*

Location	Depth in drift	Total depth	Altitude at bottom of well
T. 3 N., R. 2 W.—	*Feet*	*Feet*	*Feet*
NE. ¼ NE. ¼ sec. 3	90	156	502
T. 4 N., R. 1 W.—			
SE. ¼ SE. ¼ sec. 16	96	96	573
NW. ¼ NE. ¼ sec. 17	102	102	568
NE. ¼ SE. ¼ sec. 18	76	76	590
SE. ¼ NW. ¼ sec. 21	100	101	565
SE. ¼ NE. ¼ sec. 21	182	182	484
SE. ¼ SE. ¼ sec. 21	172	172	480
SW. ¼ NE. ¼ sec. 32	74	74	576
T. 4 N., R. 2 W.—			
SW. ¼ SW. ¼ sec. 2	65	65	565
NW. ¼ SW. ¼ sec. 4	90	90	550
SW. ¼ NW. ¼ sec. 5	70	77	556
SE. ¼ SE. ¼ sec. 10	100	117	503
NW. ¼ NW. ¼ sec. 11	50	50	575
SW. ¼ SW. ¼ sec. 12	137	137	510
SW. ¼ SE. ¼ sec. 13	96	96	570
T. 5 N., R. 1 W.—			
SE. ¼ NW. ¼ sec. 4	60	60	595
NE. ¼ SE. ¼ sec. 6	58	58	600
SE. ¼ SE. ¼ sec. 6	185	185	471
SW. ¼ NE. ¼ sec. 9	42	42	590
NW. ¼ SW. ¼ sec. 16	65	65	360
SW. ¼ NE. ¼ sec. 19	65	65	575
SE. ¼ NE. ¼ sec. 20	100	100	530
NW. ¼ SW. ¼ sec. 21	90	90	550
SW. ¼ NE. ¼ sec. 21	105	105	530
NE. ¼ NE. ¼ sec. 28	100	100	540
SE. ¼ NE. ¼ sec. 28	75	75	570
SW. ¼ NW. ¼ sec. 32	80	80	580
NE. ¼ NW. ¼ sec. 33	80	80	560
NW. ¼ NE. ¼ sec. 33	130	230	420
T. 5 N., R. 2 W.—			
NW. ¼ NW. ¼ sec. 7	85	85	610
NE. ¼ SE. ¼ sec. 7	140	140	555
NW. ¼ NW. ¼ sec. 8	176	177	530
NW. ¼ SW. ¼ sec. 8	65	65	625
SW. ¼ NE. ¼ sec. 9	35	35	610
NW. ¼ SW. ¼ sec. 10	55	55	573
SW. ¼ NW. ¼ sec. 19	123	123	542
NW. ¼ SE. ¼ sec. 19	175	175	495
SW. ¼ SW. ¼ sec. 23	150	150	500
SE. ¼ SW. ¼ sec. 23	60	60	585
SW. ¼ NE. ¼ sec. 26	40	40	595
SW. ¼ SW. ¼ sec. 27	110	110	520

Location	Depth in drift	Total depth	Altitude at bottom of well
	Feet	*Feet*	*Feet*
NE. ¼ NE. ¼ sec. 28	90	90	550
SE. ¼ NE. ¼ sec. 34	98	98	528
NW. ¼ SW. ¼ sec. 35	83	84	562
T. 5 N., R. 3 W.—			
SE. ¼ SE. ¼ sec. 10	76	76	594
NE. ¼ SE. ¼ sec. 14	90	90	560
NE. ¼ NE. ¼ sec. 15	100	100	570
NE. ¼ NE. ¼ sec. 23	35	35	575
SW. ¼ NE. ¼ sec. 33	170	170	488
SW. ¼ SE. ¼ sec. 36	45	46	584
T. 6 N., R. 1 W.—			
SE. ¼ SW. ¼ sec. 19	100	100	572
SE. ¼ NE. ¼ sec. 21	103	103	550
SE. ¼ SW. ¼ sec. 28	126	126	549
NE. ¼ SE. ¼ sec. 29	100	100	575
NE. ¼ SW. ¼ sec. 29	100	100	565
NE. ¼ NE. ¼ sec. 29	135	135	542
SW. ¼ SE. ¼ sec. 30	75	75	587
NE. ¼ NE. ¼ sec. 31	110	110	552
NW. ¼ NE. ¼ sec. 33	93	93	560
T. 6 N., R. 2 W.—			
NE. ¼ NE. ¼ sec. 34	80	80	597
SE. ¼ SE. ¼ sec. 34	75	75	602

Coal No. 2 contains no persistent partings of incombustible matter, but bears locally a few short lenses and small nodules of iron pyrites ("sulphur"), films of mother coal, calcite and gypsum, and streaks of bone one inch and less thick. The coal is jet black with a few alternating bands of duller luster. The fracture is hackley, and no well-developed vertical or horizontal cleavages are noticeable. As only a comparatively small number of horsebacks, clay slips, and rolls and potholes in the roof are present, the bed presents quite uniform mining conditions.

Near Colchester coal No. 2 varies only a few inches from an average thickness of 28 inches. North of East Fork and near Tennessee it is somewhat thinner in places. The roof is a fairly strong, light-drab clay shale ("soapstone"). The underclay is soft and 3 to 4 feet thick, but a firmer sandy clay lies about 18 inches below the coal on the north side of the fork. West of Colchester a thin layer of "slate," a black carbonaceous clay with coal streaks, appears at the base of the coal and thickens to 10 inches northeast of Tennessee.

In the coal area in the southern part of the Macomb quadrangle, including the Gin Ridge district on the west and the Littleton district farther east, the coal also averages about 28 inches thick. In many places a massively

TABLE 31.—*Proximate analyses of coal No. 2 (Colchester, or Murphysboro coal) near Colchester (average of 2 mines)*[a]

	As received			Air dry			Moisture free			Moisture and ash free		
	High	Low	Average	High	Low	Average	High	Low	Average	High	Low	Average
Moisture	19.35	16.39	17.15	4.58	2.91	40.60	.....	.....	.....	.....	.....	.....
Volatile matter	34.64	31.70	33.63	40.24	37.70	38.99	41.44	39.35	40.60	.....	.....	.....
Fixed carbon	42.46	40.61	41.63	48.91	47.42	48.28	50.83	49.47	50.27	.....	.....	.....
Ash	8.34	6.84	7.58	9.93	7.94	8.74	10.35	8.18	9.16	.....	.....	.....
Sulphur	2.70	1.71	2.19	3.14	1.95	2.68	3.23	2.04	2.64	.....	.....	.....
B. t. u.	11,216	10,392	10,912	13,028	12,358	12,652	13,418	12,898	13,173	.....	.....	.....

[a]Air-dry loss: high 15.91, low 12.46, average 13.76.

Proximate analyses of coal No. 2 (Murphysboro coal) from south half of Macomb quadrangle (average of 2 mines)[b]

Moisture	14.64	12.88	13.84	4.45	3.29	3.81	.....	.....	.....	.....	.....	.....
Volatile matter	38.62	36.98	37.76	42.67	41.36	42.15	44.58	42.77	43.83	47.71	46.87	47.20
Fixed carbon	42.97	41.87	42.23	45.57	46.67	47.17	49.41	48.49	49.02	53.13	52.29	52.79
Ash	7.56	5.53	6.16	8.46	6.11	6.88	8.74	6.35	7.15	.....	.....	.....
Sulphur	3.37	2.41	2.98	3.80	2.66	3.33	3.95	2.77	3.47	4.25	2.96	3.74
Calories	6,621	6,362	6,476	7,316	7,116	7,219	7,600	7,358	7,499	8,115	8,063	8,087
B. t. u.	11,918	11,452	11,657	13,169	12,809	12,994	13,680	13,244	13,497	14,607	14,513	14,556

[b]Air-dry loss: high 11.3, low 9.5, average 1.04.

bedded sandstone rests directly on the coal, in others a few inches to 15 feet or more of clayey or sandy shale intervenes. In the mines near Industry the roof is either shale or sandstone and the coal 27 to 32 inches thick, though where it is thickest the lower 2 or 3 inches are likely to be dirty.

CHEMICAL CHARACTERISTICS

The following analyses show that the coal mined in this region compares very favorably with that from other fields in Illinois and neighboring states. Samples for analysis were obtained according to the standard regulations adopted by this and other surveys and by the Bureau of Mines. A freshly mined face of coal was carefully cleaned and a channel of uniform width and depth cut from top to bottom so as to obtain equal proportions of coal from all parts of the bed. Pyrite lenses more than one-half inch thick were excluded, since they are usually discarded by the miners. The coal fragments were caught on a waterproof blanket and crushed until all would pass through a sieve of ½-inch mesh. The sample was then thoroughly mixed and quartered several times, alternate quarters being thrown away, until only sufficient coal to fill an air-tight can was left. The can was hermetically sealed in the mine. The Colchester mines were sampled by F. H. Kay, the others by the writer.

TABLE 32.—*Ultimate analysis of coal No. 2 (Murphysboro coal) from south half of Macomb quadrangle (composite of 2 samples)*

	As received	Air dry	Moisture free	Moisture and ash free
Hydrogen	5.97	5.35	5.10	5.47
Carbon	63.07	70.71	73.77	79.10
Nitrogen	1.17	1.31	1.37	1.47
Oxygen	20.87	12.63	9.32	9.99
Sulphur	3.16	3.54	3.70	3.97
Ash	5.76	6.46	6.74	....
Calories (calc'd.)	6,325	....	....	....
B. t. u. (calc'd.)	11,385	....	....	....

PRODUCTION, MINES, AND MINING METHODS

The former comparatively large production from Colchester and the present stagnation of the industry have already been sketched. Worthen states that the shipments from Colchester alone for the years 1866 and 1867 were about 500,000 tons per annum. The Federal Census for 1880 gives the production of McDonough County, by far the greater part of which then, as now, came from Colchester and the district south of Macomb, as 82,304 tons. The largest recorded output since that time was 189,350 tons in 1883. According to the Illinois Bureau of Labor Statistics the production for McDonough County was 109,723 tons in the fiscal year 1885, 83,401 tons in

1890, 49,709 tons in 1895, 64,822 tons in 1900, 43,944 tons in 1905, and 23,999 tons in 1911. Almost as much coal is mined within the limits of the quadrangles in the northern part of Schuyler County as is mined outside them in McDonough County. Most of the best coal near Colchester has been mined out, and the prairie near the town is dotted with many dump heaps from old mines, each of which worked out about 20 acres. The aggregate value of the product in 1911 was $44,647, or an average of $1.86 per ton for all grades.

All the mines now in operation are local affairs in the Murphysboro bed and supply neighboring towns and farming country. The Colchester Coal Co. has the only mine provided with railroad facilities and ships one or two cars a week to Macomb. Most of the mines reach the coal by drifting in from its outcrop. The Colchester Coal Co., Chas. Atkinson, and Wm. Robinson hoist by steam power, but at the other shaft mines the product is hoisted by horse whims. Underground haulage is by hand or, in a few places, by powerful dogs, as it is not practicable to make the roadways of sufficient height to permit the entrance of mules. The room-and-pillar plan of mining is followed exclusively. It is claimed that the longwall plan is not satisfactory because of the heaving of the underclay, the breaking through of the roof where the drift lies near the coal, and the brittleness of the roof in a few localities. It is probable, however, that longwall could be made profitable if the working faces were advanced rapidly. Comparatively few timbers are used. The general practise is to undercut the coal a short distance and then wedge it down. Very little powder is used, as it shatters the coal and roof too badly.

Following is the list of the mines that were being worked or were in condition to be worked during the autumn of 1912. Many new mines are started each winter and old ones abandoned, as it is easier to make a fresh opening than to clean out workings that have lain idle during the spring and summer.

TABLE 33.—*List of working or workable coal mines in 1912*

Mine	Kind of opening	Location					Coal (No. 2)	
		Fraction of section	Sec.	T. N.	R. W.	Map No.	Alt. top of coal	Thickness
							Feet	*In.*
Uriah Sloan	drift	NW. SW.	7	3	1	1	590	33
D. H. Payne	drift	SE. SW.	1	3	2	2	563	29
Edward Morell	drift	NW. SW.	11	3	2	3	587	30
Charles Yapp	drift	NE. NW.	12	3	2	4	580	28
W. F. Bly	drift	NW. NE.	12	3	2	5	581	28
I. M. Felhammar	drift	SW. NE.	2	3	3	6	590	28
A. C. Redding	drift	SE. NE.	3	3	3	7	590	30
W. H. Hendricks	drift	NW. NW.	4	3	3	8	607	24
Pruett estate	drift	NE. NW.	4	3	3	9	600	24
Hugh Swearingen	drift	NE. NE.	10	3	3	10	575	29

TABLE 33.—*List of working or workable coal mines in 1912*—Concluded

Mine	Kind of opening	Location					Fraction (No. 2)	
		Fraction of section	Sec.	T. N.	R. W.	Map No.	Alt. top of coal	Thickness
Thomas Lantz	drift	SW. SE.	11	3	3	11	585	30
Wm. Baxter	drift	SE. SE.	11	3	3	12	580	30
D. Runkle	drift	NE. SE.	12	3	3	13	595	28
John Legg	drift	NE. SE.	12	3	3	14	593	28
Frank Burdick	shaft, 37 ft.	SE. NE.	16	4	2	15	565	32
Amos Ellis	shaft, 58 ft.	SW. NE.	16	4	2	16	565	26
Joseph Macintosh	shaft, 17 ft.	SW. NW.	19	4	2	17	585	27
George Curtis	drift	SW. SE.	19	4	2	18	581	30
P. M. Jennings	shaft, 40 ft.	SW. SE.	20	4	2	19	580	28
Edward Zinn	shaft, 32 ft.	NW. SE.	20	4	2	20	585	29
W. V. Thompson	drift	NW. SW.	23	4	3	21	585	27
Alex Norse	drift	SW. NE.	23	4	3	22	585	31
Joseph McKany	slope	NE. NE.	25	4	3	23	590	28
L. Willey	drift	NE. NW.	25	4	3	24	580	28
Henry Finch	drift	SE. NW.	25	4	3	25	580	31
Hiram Stoneking	drift	SE. SE.	28	4	3	26	600	27
Willis Stoneking	drift	NE. SE.	33	4	3	27	600	26
I. A. Botts	drift	NE. SE.	35	4	3	28	580	26
John Wilson	shaft, 65 ft.	SW. SW.	5	5	3	29	590	24
R. E. Pearson	drift	NW. SW.	7	5	3	30	615	28
James Whallen	drift	SW. NE.	1	5	4	31	640	24
H. Bunt	drift	SW. SE.	1	5	4	32	635	28
—— Wilson	drift	NW. SW.	1	5	4	33	650	24
Eli Hilliard	drift	NE. SW.	1	5	4	34	632	24
Wm. Jones	drift	NE. NW.	2	5	4	35	640	24
Harpe and Fentens	drift	NE. NW.	2	5	4	36	640	24
Lee McClure	drift	NE. SE.	3	5	4	37	640	26
Marion McClure	drift	SE. SE.	3	5	4	38	642	28
Fox Bros.	drift	SE. SE.	11	5	4	39	650	32
D. Perry	drift	SE. SE.	11	5	4	40	650	30
George Polonis	drift	SE. SE.	11	5	4	41	650	30
Wayland Bros.	drift	SW. SW.	12	5	4	42	630	28
John Zimmerman	drift	NE. SE.	12	5	4	43	623	24
Mourning and Davison	drift	NE. NW.	13	5	4	44	630	30
Ralph Burney	drift	NE. NW.	13	5	4	45	637	28
Colchester Coal Co.	shaft, 60 ft.	NW. SE.	13	5	4	46	635	29
Farrenkoff Bros.	drift	NW. NW.	14	5	4	47	660	24
F. W. Whalin	drift	NE. NE.	15	5	4	48	660	24
Wm. Robinson	shaft, 58 ft.	SW. SE.	32	6	3	49	605	29
Chas. Atkinson	shaft, 96 ft.	NE. SW.	32	6	3	50	600	29
Wm. Marten	drift	NW. SE.	36	6	4	51	633	23

CLAY AND SHALE

IMPORTANCE

As the production of coal declined in this region, that of clay products increased, until today the annual output has a value of more than half a million dollars. Macomb is one of the principal clay manufacturing centers of the State, and Colchester one of the best-known clay-mining localities. Some of the clay and shale mined from the Pottsville formation is shipped to Monmouth and other places, but by far the greater part is utilized at the large plants at Macomb.

Draintile and common brick were made at Colchester and elsewhere at an early date and are still made for local use in plants at Colchester, Macomb, and Industry. Cleveland & Sons erected shops at Bardolph in 1870 and engaged in the manufacture of crocks, jugs, jars, and other stoneware. Horricks, Stevens, and Co. also engaged in the making of draintile, common brick, and fire brick at Bardolph about 1875. Abraham Newland operated a brick and pottery plant at Tennessee a number of years ago. No clay products are now made at either of these towns.

Five large plants at Macomb are now burning clay and shale from Colchester and Macomb. The Macomb Sewer Pipe Co. ships annually about 3,000 cars of sewer pipe, water pipe, culvert pipe, and similar products from two large plants, the West Plant on the west side of the city and the East Plant in the northeast corner of town. A total of 32 down-draft kilns are in operation. The Western Stoneware Co. operates two large plants for the manufacture of jugs, jars, crocks, and other stoneware pottery, Plant No. 3 being just east of the railroad station and Plant No. 4 on the west side of town. The Buckeye Pottery Co. also ships considerable quantities of stoneware pottery from its plant 4 blocks west of the station. The Illinois Electric Porcelain Co. has a new plant in the northeast part of the city for the manufacture of insulators and other electric supplies. Some sagger clay from the Johnson farm near Colchester is the only local material used, kaolin being obtained from Georgia, ball clay from the State of Tennessee, ground silica from Oregon, Illinois, and feldspar from Maine and Canada.

Although the clay industry is in so flourishing a condition, it has not yet exhausted the possibilities of the raw materials available. Tests of clay and shale from near Macomb, Colchester, and Tennessee indicate that some of the Pottsville deposits can be used for terra cotta, paving brick, and No. 2 fire brick, articles not now being produced. Although a great variety of stoneware pottery is burned, the clays are suitable for a number of other articles for which a market might be developed. Ries enumerates the following products that may be made from stoneware clays: meat jars, butter jars, preserve jars, bean pots, jelly pots, churns, milk pans, filters, jugs, umbrella stands, vases, beer mugs, cuspidors, flower pots, hanging baskets, milk and mustard pitchers, pie plates, snuff jars, drinking fountains, French pots, stew pans, teapots, custards, shirred egg dishes, match safes, coquilles, bakers, nappies, plates, jardinieres, and all kinds of chemical stoneware.

The clay products are made from materials derived from three formations: (1) common brick and tile from loess and glacial drift, (2) brick, tile, and silo blocks from shale in the Carbondale formation, and (3) stoneware, sewer pipe, and others, from clay and shale in the Pottsville formation. The Pottsville deposits are by far the most important. Several land

owners consider the blue Mississippian shale to be of value, but most of it contains too much calcareous matter to compete with the better materials of Pennsylvanian age.

LOESS AND DRIFT CLAYS

Two tile and brick plants near Colchester use a mixture of surface materials and Pennsylvanian clay and shale. Two yards in the Macomb quadrangle and one at Littleton, just beyond its south boundary, supply the local demand for common brick and draintile by burning surface deposits alone. The loess overlies all other deposits on the uplands and on by far the greater part of the valley slopes, and is a fine-grained clay with a large percentage of very fine sand. It is buff to gray in color and 5 to 20 feet thick. It is fairly uniform in its physical characters, though somewhat coarser and more sandy on the slopes of the main valleys than on the uplands. Loess contains small, round, iron-bearing concretions that give the product a deep-red color and local segregations of calcium carbonate that change to lime in burning and afterward tend to slack and swell, causing a spalling or peeling off of the surface if the lime is in large pieces. The burning shrinkage of upland loess is high, and careful burning is essential to prevent cracking. In spite of these drawbacks, however, common brick and tile of fair quality can be made from loess, and its widespread distribution makes it available for use in practically every locality. Glacial till could also be used in the same way were the number of included pebbles not a serious detriment.

Price and Gunning have a small brick and tile factory in the north part of Industry (SW. ¼ NE. ¼ sec. 15) where the product is burned in 2 kilns. Surface materials from a pit beside the factory are used. The upper foot exposed in the pit is a very fine, ashy loess, the rest of the deposit is chiefly pebbleless, drab to yellow clay. In the bottom of the pit a few pebbles are embedded in the clay, and their number increases with increasing depth. Although the pebbleless portion is probably loess and lower part glacial till, there is no difference in the physical appearance and working qualities of the clay. The upper limit of pebbles varies greatly in position, and there is a very gradual transition from pebbleless to abundantly pebble-bearing clay.

P. H. Tiernan has 4 down-draft kilns one-half mile west of Macomb (NW. ¼ SW. ¼ sec. 36, map number 53) and makes red building brick during the warmer months. The present pit, a few rods north of the yard, shows 2 feet of gray loess at the top with 5 feet of pebbleless clay beneath. The floor of the pit is gravelly till, the gradation between it and the loess being about the same as in the Price and Gunning pit.

SHALE IN CARBONDALE FORMATION

In many parts of the region the drab shale immediately above coal No. 2 is sufficiently thick to form an important resource. As will be mentioned later, this shale is occasionally mixed with Pottsville materials and used for the more common clay products. It is probable that it could be used for sewer pipe and paving brick, either alone or mixed with loess and with clay from the Pottsville formation. Near Colchester are 30 feet and more of clayey shale that could be conveniently stripped together with the underlying materials. North of East Fork and in the southern part of the Macomb quadrangle massive sandstone or very sandy shale lies so near the top of coal No. 2 in many places that the intervening shale is too thin to be utilized. Even in the southern part of the Macomb quadrangle, however, there are many exposures of 15 feet or more of clayey shale belonging to the Carbondale formation. In an easily accessible ravine southwest of Industry (NE. ¼ sec. 2, T. 3 N., R. 3 W.) there is more than 50 feet of only moderately sandy shale resting on the Murphysboro coal bed.

CLAY AND SHALE IN POTTSVILLE FORMATION

IMPORTANCE OF POTTSVILLE MATERIALS

Practically all the argillaceous sediments between coal No. 2 and the basal Pennsylvanian sandstone have been used at one time or another for various clay products, but the most valuable stratum lies at the potters' or stoneware clay horizon just above the sandstone and 30 to 40 feet below the coal. From this stratum comes all the clay used for sewer pipe and pottery at Macomb. The following detailed mention of past and present pits, prospects, and mines shows the nature of the deposits where practical commercial tests have been made.

CLAY PITS

Clay in the Pottsville formation was formerly mined extensively 2 miles west of Bardolph (NE. ¼ sec. 22), where an open cut about 60 feet wide and 150 feet long was made and some material also obtained by drifting. The product was hauled over a tramway to the factories at Bardolph, where it was made into brick, drain tile, and pottery. No work has been done for many years and the clay is now almost completely concealed. Similar clay was also found in the draw one-half mile west of Bardolph, but a trial shaft 70 feet deep at Bardolph itself is said not to have penetrated it.

The largest producer in the region is the Macomb Clay Products Co., whose open pit work 3 miles northeast of Macomb (E. ½ NW. ¼ sec. 20, map number 54) is removing an entire hill. At present 24 feet of stripping, consisting of 16 feet of loess, 2 feet of gravel and till, 4 feet of white sandstone, and 2 feet of white clay, is excavated by a steam shovel and thrown on the dumps. Another steam shovel follows the first and recovers

2 feet of white, rather thin-bedded sandstone and 10 to 12 feet of light to dark blue, very sandy, compact clay that rests on dark blue shale containing clay ironstone concretions. The altitude of the base of the clay is 609 feet and is 21 feet above East Fork. The product of the second shovel, except portions of the sandstone that are pitted with numerous specks of weathered iron pyrites, is loaded on a spur and shipped to the Macomb Sewer Pipe Company's plants at Macomb. As the stripping shovel can not keep pace with the other, causing a shortage of raw material at times, clay from the Johnson farm near Colchester is also used at the plants.

For about 20 years clay for Macomb sewer-pipe plants was obtained from the S. Russell farm, one mile north of Macomb (NW. ¼ NE. ¼ sec. 25). Large open pits were excavated and drifts driven in from their sides in clay that lies about 15 feet above low water in the creek. Work has been discontinued for so long, that the exposures are now very poor, but Mr. Russell reports the succession to be as follows:

Section at abandoned clay pit, NW. ¼ NE. ¼ sec. 25, T. 6 N., R. 3 W.

Description of strata	Thickness *Feet*
Shale, replaced by drift on the north	8 – 25
Sandstone, pure white to light buff, massive, composed of translucent quartz grains	2 – 8
Clay, cream white, a coarse fire clay	4
Clay, variegated, reported a good stoneware clay	8
Coal ("No. 1")	½

An abandoned pit two miles northwest of Macomb (NE. ¼ SW. ¼ sec. 26) is reported to have furnished shale from which was made the paving brick used on certain Macomb streets. The shrinkage is said to have been too high for sewer pipe and similar products. About 21 feet of light drab to blue shale, with a little clay and sandstone, is now exposed under 8 feet of loess and till. Near its base (altitude about 610 feet) are 2 feet of black shale with a few inches of coal ("No. 1"), and under it a massive sandstone that has been quarried.

The Colchester Brick and Tile Co. operates a plant with 4 kilns one-half mile north of Colchester (SW. ¼ NE. ¼ sec. 12, map number 55), making building brick, draintile, silo blocks, and sidewalk pavers. In the pits on the sides of the ravine (fig. 7) beside the plant a complete section of the Pennsylvanian from above coal No. 2 to the base of the stoneware clay is exposed and is printed later in the description of clay samples obtained for testing. All this material, 47 to 55 feet thick, can be used for clay products. In addition about 10 feet of loess on the divide is also available and the coal can be utilized in the kilns. The stoneware clay at the base is 10 feet thick and burns to a very pleasing cream or nearly white color. One foot of firm argillaceous sandstone rests on it and would make a moder-

ately strong mine roof. A thick, thin-bedded yellow to red sandstone underlies the clay. When a red color is desired the shale above the clay is added in large proportions. Common brick are made from shale or from shale and loess mixed. Hollow ware is made from shale and stoneware clay mixed.

Baird Bros.' clay mine is one-half mile northwest of Colchester (NE. ¼ SW. ¼ sec. 12, map number 56). Stoneware clay is obtained chiefly from a drift mine on the east side of the ravine and is used in making jugs, jars, crocks, and other stoneware pottery at the plant of the Western Stoneware Co. at Macomb. It makes very attractive white or cream-colored pottery of high grade. Floor brick for the kilns at the potteries are also

Fig. 7.—Pit of Colchester Brick and Tile Company showing coal No. 2 near top and stoneware clay at base.

made from this clay and successfully withstand a very high temperature. This drift mine has worked out about 60 acres of clay on the room-and-pillar plan of mining. The average thickness of the clay is about 8 feet, but the upper 2 feet are commonly left up in order that a thin streak of sandstone near the base may serve as a mine roof. In a few places the clay mined is as much as 12 feet thick. It has a dark-gray color with black carbonaceous streaks near the bottom, the fracture is subconchoidal, and it is nearly free from iron. A layer a foot thick and 2 feet from the bottom is so sandy and firmly cemented that it is usually thrown in the gob. Few timbers are used except in the entries and much care is necessary in the rooms. Pit cars are hauled by mules from the interior of the mine along

a tramway up the ravine to a tipple on the railroad, more than one-half mile distant.

A few rods down the ravine and on its west side is a short drift, and a small strip-pit from which is obtained material from the base of the stoneware clay to within 12 feet of the Murphysboro coal bed. A description of these strata may be found on a following page where a typical section is given for the Pottsville formation. The shale and clay from the strip-pit are shipped to Monmouth and made into sewer pipe.

The B. F. Myers drift is only a short distance southwest of the Baird mine, on the opposite side of a narrow divide (SW. ¼ SW. ¼ sec. 12, map number 57). The clay in this mine is in every way similar to that at the Baird drift. It is 8 feet thick on the south and 6 feet and of better quality on the north. The product is hauled one-half mile over a tramway to the railroad and shipped to Macomb, where it is used for all kinds of stoneware pottery by the Buckeye Pottery Co.

The Northwestern Terra Cotta Co. of Chicago prospected and purchased a tract of land one mile northwest of Colchester with the intention of utilizing Pottsville sediments for terra cotta and other clay products, but has not yet begun active operations. At their pit (SE. ¼ SE. ¼ sec. 11) there is exposed 39 feet of clay and shale, including about 3 feet of sandstone. The top of the pit is close to the horizon of coal No. 2 and the bottom less than 15 feet above the St. Louis limestone. The section exposed appears to be similar to that at the Colchester Brick and Tile Company's pit.

The farm of Charles Johnson, 2 miles southwest of Colchester (E. ½ sec. 23) has long been known as a producer of clay and shale from the Pottsville formation. Work had been temporarily suspended when the locality was visited in the fall of 1912, but has been carried on in the past by shafting, drifting, and stripping. Connection with the railroad is obtained by means of a short spur and the product is shipped to Monmouth, Macomb, and elsewhere. Sewer pipe is made from the shale above coal "No. 1" mixed with the clay below it. Some of the clay below coal "No. 1" can be used for stoneware, but parts of the bed must be mixed with other clays for that purpose. This clay is said to be the most refractory and plastic in the district; an exposed section is described as follows:

Section of exposed beds in the clay pit in NE. ¼ SE. ¼ sec. 23, T. 5 N., R. 4 W.
(map number 58)

Description of strata	Thickness *Feet*
Sandstone, bluish white to brown and deep buff, in places thin bedded and with shale partings, in others massive (top 20 feet below Murphysboro coal)	8
Shale, drab, sandy at top, clayey below	10
Coal ("No. 1"), thickness variable, average	1½

Clay, white, sandy, indurated 3
Clay, dark gray to blue, slightly sandy 6
Clay, white, sandy, indurated (St. Louis limestone less than 5 feet lower) 4

A number of years ago Abraham Newland operated a brick and pottery plant at Tennessee, and used Pottsville deposits from north of Tennessee and from a now abandoned shaft sunk beside the railroad halfway between Tennessee and Colchester (SE. ¼ SW. ¼ sec. 14, T. 5 N., R. 4 W.).

Log of abandoned Newland shaft between Tennessee and Colchester

Description of strata	Thickness		Depth	
	Ft.	*in.*	*Ft.*	*in.*
Surface deposits—				
Soil and yellow clay	11	..	11	..
Gravel	4	..	15	..
Carbondale formation—				
Shale	16	..	31	..
Coal No. 2 (Murphysboro coal)	2	3	33	3
Shale, black, carbonaceous ("slate")	..	9	34	..
Pottsville formation—				
Clay, reported to make nearly white fire brick of good quality	6	..	40	..
Clay, reported to make good terra cotta, etc	5	..	45	..
Clay, dark blue, containing limestone boulders	9	..	54	..
Sandstone, clayey, firmly cemented	2	6	56	6
Clay, reported fine quality for stoneware	10	0	66	6
Shale, black, slaty, very carbonaceous	3	0	69	6
Shale, blue	5	0	74	6
Sandstone, dark gray, very firmly cemented	4	0	78	6
Coal ("No. 1", but lower than "No. 1" on Johnson farm)	1	0	79	6

Mr. Newland states that practically all the shale and clay in this section was used at one time and another. After coal No. 2 was mined out and the pillars pulled, the overlying shale was used for brick and red draintile. The underclay of the coal produced good fire brick, although tests of this bed at several other places near Colchester have been unsuccessful. The lower clays appear to have been very similar to those now mined northwest of Colchester.

A well recently dug and bored on the land of F. W. Whalin, 2 miles west of Colchester (NE. ¼ NE. ¼ sec. 15) penetrated strata nearly identical with those in the Newland shaft. Clay from the stoneware horizon has been taken from this land for use in the Tennessee and other plants.

Much clay was formerly dug by shafting, drifting, and stripping on the farm of J. C. McClure 1½ miles north of Tennessee (SW. ¼ sec. 10). It was hauled in wagons to Tennessee, where much of it was burned and some shipped to other points. The pits are now poorly exposed, but there is reported to be 8 to 12 feet of stoneware clay. The clay is underlain with

white sandstone that lies on the St. Louis limestone. There appears to be a large quantity of clay that could be easily stripped with a steam shovel.

Lee McClure operates a small clay plant 2½ miles north of Tennessee (SE. ¼ NE. ¼ sec. 3, map number 59), making a faintly red draintile from a mixture of loess and clay from the stoneware clay horizon of the Pottsville. The clay is obtained in the hollow southeast of the plant (SW. ¼ sec. 2) and a section of the strata exposed is printed in the report on clay tests.

AREAL DISTRIBUTION

The location of the high-grade clays and shales of the Pottsville formation deserves special notice. There are two districts in which commercial development has proved to be of considerable value. One of these includes most of a strip about one mile wide on the north side of the East Fork of Crooked Creek from the west line of sec. 26, T. 6 N., R. 3 W., northeast to the north boundary of the quadrangle. The area from a quarter of a mile to two miles west of Bardolph, on the south side of the creek, is virtually part of the same district. The second district includes strips of both sides of East Fork from north of Colchester to north of Tennessee. It also includes the divide between Colchester and Tennessee and the deposits on the Johnson farm, southwest of Colchester. These two districts contain sufficient high-grade clays and shales to supply demands for many years to come.

In addition to the two production districts, the clay and shale horizons of the Pottsville underlie all the territory mapped as containing coal No. 2 and a marginal area beyond the limits of that bed. Practically all this territory probably contains the raw materials for many clay products, but as outcrops of the Pottsville are poor or absent in most of it, only systematic prospecting can demonstrate the position of the best deposits. Outcrops from the stoneware clay horizon to 33 feet above coal No. 2 in the extreme southeastern corner of the Macomb quadrangle indicate the absence of pottery material, though there is in the Pottsville an abundance of shale for commoner clay products.

In the southwestern quarter of the Macomb quadrangle the Pottsville is exposed in a number of places. In general the strata above the stoneware clay horizon contain more sandstone than those near Colchester and Macomb, a factor that might be detrimental in extensive stripping operations. The stoneware-clay bed is well exposed in several bluffs on Camp and Grindstone creeks in secs. 11, 15, 23, and 24 (?), and in ravines in the N. ½ sec. 26 and SW. ¼ sec. 28, all in T. 4 N., R. 3 E. It is likely that careful prospecting would reveal on and near these streams and also on Willow Branch easily accessible deposits that equal in quality and thickness those now being developed on East Fork drainage. The greater the proportion of shale and clay in the section, the fewer are the natural expos-

ures, so that the outcrops now visible are hardly fair indices to the real value of the Pottsville in this area. The following outcrop, however, contains material that appears to be especially promising.

Section of bluff on Camp Creek, NW. ¼ SW. ¼ sec. 15, T. 4 N., R. 3 W.

Description of strata	Thickness Ft.	in.
Coal No. 2 (Murphysboro coal)	..	..
Concealed, chiefly shale and clay	10	..
Clay, white and yellow, sandy, sandstone layer near middle	6	6
Shale, drab, clayey, plastic	9	..
Shale, bluish black, carbonaceous	1	6
Coal ("No. 1")	..	4
Clay, drab	1	6
Shale, bluish gray, micaceous, very sandy, with iron concretions in places and sandstone lenses near base	3	..
Clay and shale, very carbonaceous near middle	4	..
Clay, yellow and light blue, very sandy to water in Camp Creek	3	..

The clay at the base of this section lies at the stoneware-clay horizon. Probably its full thickness is shown, as sandstone appears at the creek level a short distance below.

MECHANICAL AND BURNING TESTS

NEW SAMPLES

In 1908 E. F. Lines of this Survey examined and sampled all the clay and shale pits and mines and the most important outcrops near Macomb, Colchester, and Tennessee. Tests were made in the ceramic laboratories of the University of Illinois, with the results shown in the two following tables.

TABLE 34.—*Tests of raw clay and shale in the Colchester and Macomb quadrangles*

Sample number	Tempering water	Working quality	Color	Drying shrinkage	Porosity
	Per cent			*Per cent*	*Per cent*
L32	21	....	Gray	5	26
L33	21	Fat	Gray	6	27
L34	24	Fat	Gray	7	30
L35	20	Lean	Drab	..	..
L38	20	....	Light gray	5	26
L39	20	Fat	Light gray	5	27
L40	18	Stiff	Gray	5	28
L41	21	Stiff	Light drab	5	28
L42	18	Fat	Light gray	5	..
L44	21	Fat	Light gray	6	30
L72	..	....	Light gray	8	28
L73	..	....	Light lavender	6	28
L75	25	....	Light gray	5	26
L76	21	Fat	Light gray	6	25
L45	20	Fat	Gray	6	26
L43	25	Fat	Light gray	6	29

The locations of samples collected for the tests are as follows:

L 32.—Dry-pan sample from the mill of the Macomb Sewer Pipe Company at Macomb.

L 33 and 34.—Samples from pit of Macomb Clay Products Company, 3 miles northeast of Macomb, NE. ¼ sec. 20, T. 6 N., R. 2 W., (map number 54).

Section from pit of Macomb Clay Products Company

	Description of strata	Thickness *Feet*
	Stripping	
4.	Sandstone	3
3.	Light-gray clay (L 33)	3½
2.	Dark-gray clay having reddish and pinkish stains (L 34)	4½
1.	Black clay containing iron concretions	..

L 35.—Sample from 10-foot outcrop on S. Russel farm, 1 mile north of Macomb, NE. ¼ sec. 25, T. 6 N., R. 3 W.

L 38.—Sample from 7½-foot face on mine on B. F. Myers farm SW. ¼ sec. 12, T. 5 N., R. 4 W. (map number 57).

L 39-42.—Samples from pit at brick yard of Colchester Brick and Tile Company, ½ mile north of Colchester, NE. ¼ sec. 12, T. 5 N., R. 4 W. (map number 55).

Section from pit of Colchester Brick and Tile Company

	Description of strata	Thickness *Feet*
10.	Gray shale	10
9.	Coal No. 2 (Murphysboro coal)	2
8.	Clay	5
7.	Gray sandy shale containing large concretions or lenses of ferruginous limestone in upper part	10
6.	Black clay stained purple on fracture surfaces and containing lime-iron concretions	4
5.	Gray sandy clay	1½
4.	Gray sandy clay stained purple in upper foot (L 39)	4½
3.	Gray clay shale (L 40)	5
2.	Sandy layer	1
1.	Gray sandy clay (L 41 upper half and L 42 lower half)	10

L 44.—Sample from 10-foot face in mine on John Farenkoff farm, 1 mile west of Colchester, SE. ¼ sec. 11, T. 5 N., R. 4 W.

L 72.—Sample from north mine on Valentine farm, ½ mile northwest of Colchester, SW. ¼ sec. 12, T. 5 N., R. 4 W. (map number 56).

Section from Valentine farm mine

	Description of strata	Thickness *Feet*
6.	Shale roof	..
5.	Gray clay (L 72)	2
4.	Gray sandstone	1
3.	Gray clay (L 72)	4
2.	Gray sandstone	1
1.	Gray clay	2

TABLE 35.—*Burning tests on clays and shales in Colchester and Macomb quadrangles*

	Cone .08			Cone .02			Cone 4			Cone 8			
Sample number	Color	Burning shrinkage	Porosity	Color	Burning shrinkage	Porosity	Color	Burning shrinkage	Porosity	Color	Burning shrinkage	Porosity	Class
L32	Pinkish yellow		24.9	Pinkish yellow	3	23.7	Reddish yellow	6		Gray	6	7.5	2
L33	Cream	1	27.9	Cream	2	23.2	Buff	4	18.4	Light drab	5	13.1	2
L34	Pinkish yellow	3	20.3	Pinkish yellow	5	7.0	Gray	7		Gray	8	1.6	B
L35	Pinkish yellow		30.1	Pinkish yellow		28.3	Pinkish yellow		25.6	Yellow		24.2	1
L38	Cream	2	34.5	Cream	3	22.1	Yellow	5	12.4	Gray	6	4.8	3
L39	Yellow	0	26.4	Yellow	3	19.0	Drab	6	10.7	Gray	6	3.0	3
L40	Reddish yellow	4		Reddish yellow	6		Yellowish brown	7		Brownish gray			B
L41	Salmon	4	25.1	Salmon	4	20.3	Grayish brown	6	6.4	Gray	7	2.7	B
L42	Yellow	1	26.1	Yellow	2	22.3	Yellow	4	15.2	Light drab	6	10.7	2
L44	Yellow		26.0	Yellow	5	24.9	Yellow	6	13.5	Gray	7	4.3	3
L72	Light yellow	2	24.9	Light yellow	4	21.9	Light yellow	6	16.9	Light gray	6	4.4	3
L73	Buff	2	27.6	Buff	3	22.3	Buff	5	18.1	Gray	7	4.2	3
L75	Light yellow	1		Light yellow	1	23.7	Light yellow	3		Light drab	3	9.8	
L76	Light yellow	2	26.3	Light yellow	3	22.2	Light yellow	4	11.2		6	6.1	3
L45	Cream	1	29.6	Cream	2	27.0	Light yellow	4	20.8	Light drab	5	13.8	2
L43	Pinkish yellow		26.9	Pinkish yellow		23.0	Yellow	6		Light drab	7	6.5	3

L 73.—Sample from 7-foot face in the south mine on the Valentine farm. Location same as L 72.

L 75-76.—Sample L 75 from outcrop and L 76 from mine on Johnson farm, 2 miles southwest of Colchester, NE. ¼ sec. 23, T. 5 N., R. 4 W. (map number 58).

L 45.—Sample from 9-foot face in mine of J. C. McClure farm, 1½ miles north of Tennessee, SW. ¼ sec. 10, T. 5 N., R. 4 W.

L 43.—Sample from outcrop on Lee McClure farm, 2½ miles north of Tennesee, SW. ¼ sec. 2, T. 5 N., R. 4 W.

Section from outcrop on the McClure farm

	Description of strata	Thickness *Feet*
6.	Yellow surface clay	3
5.	Gray clay (L 43)	5½
4.	Concealed	7
3.	Impure coal	1½
2.	Concealed	1
1.	St. Louis limestone	6+

OLD SAMPLES

Samples collected in 1904 were also subjected to various tests, among them the determination of the vitrification and fusion points.[3] Samples H 41, H 42, and H 43, were obtained at the works of the Western Stoneware Company at Monmouth. H 41 and H 43 were reported to come from Colchester and H 42 from Tennessee. These clays are mixed for the production of stoneware. Samples H 44, H 45, and H 46 are from the Russell farm, one mile north of Macomb, and were sent in by Dr. Russell. H 44 and H 45 are from the upper part of the clay horizon shown in the section on a previous page, while H 46 is from the lower part.

TABLE 36.—*Mechanical analyses of clays from Warren and McDonough counties*

Sample	Moisture	Volatile	Residue left on screens					Finer than 200 mesh	Total per cent	Plasticity
			20 mesh	60 mesh	100 mesh	150 mesh	200 mesh			
H 41	1.82	6.60	0.24	0.38	2.03	6.99	2.36	77.88	98.30	C
H 42	1.94	6.74	6.27	0.76	0.70	3.12	2.32	75.94	98.18	D
H 43	2.16	7.94	14.25	16.86	5.06	4.50	1.48	43.93	96.18	D
H 44	0.82	4.00	0.161	3.04	16.56	28.84	6.14	24.88	82.64	D
H 45	0.66	2.96	6.265	4.24	2.60	6.11	7.26	37.65	67.75	D
H 46	1.24	3.94	0.101	0.56	3.41	21.02	3.64	65.82	99.73	C

[3]Purdy, R. C., and DeWolf, F. W., Preliminary investigations of Illinois fire clays: Ill. State Geol. Survey, Bull. 4, pp. 162-165, 1907.

TABLE 37.—*Chemical analyses of clays from Warren and McDonough counties*

Sample	Moisture	Volatile	SiO_2	Fe_2O_3	Al_2O_3	TiO_2	Total per cent
H 41	1.25	7.05	66.50	1.56	21.50	1.28	99.14
H 42	1.62	7.37	65.14	1.59	21.53	1.60	98.85
H 43	1.41	8.25	55.96	1.57	29.47	1.60	98.26
H 44	0.33	4.31	78.46	1.29	13.97	1.02	99.38
H 45	0.49	3.03	83.34	0.80	8.42	0.80	96.88
H 46	0.81	4.32	77.88	1.05	14.42	0.93	99.41

Results of the pyrometric tests were as follows:

H 41.—This clay started to bend at cone 28 and was fused flat at cone 30. In the preliminary burn this clay was vitrified at cone 20.

H 42.—This sample was bending and bloating at cone 29. In preliminary burn it was vitrified at cone 20.

H 43.—The final test on this clay was very unsatisfactory. When cone 29 was down, two of the cones made from this clay were beginning to bend, while the third one was erect. When cone 31 was touching the plaque, one of the clay cones that was started at cone 29 was flat and fused, while the other one, like the third clay cone, was vitrified and blistered, but not down. In the preliminary burn this clay was vitrified at cone 20.

H 44.—This clay started to bend at 27 and was just touching the plaque at cone 31. In the preliminary burn it was standing at cone 20.

H 45.—The cones made from the clay began to bend at cone 27 and were flat at cone 29. In the preliminary burn this clay was vitrified at cone 20.

H 46.—All cones were flat and fused at cone 29. No record was obtained as to when they began to fuse. In the preliminary burn this clay resembled H 45 in every respect.

In testing the characteristics during the burning process these clays were made up into briquets by the stiff-mud process and burned at 1120° C. Each burned fine light buff and was quite porous.

SUMMARY

Sample H 41 has a fair texture and fineness of grain, but H 42 and H 43 are quite coarse. None of these three samples show much plasticity. They are all comparatively low in iron content, and their relative fusibility corresponds or is roughly proportioned to their content of fluxing ingredients other than iron. Such factors as content of SiO_2 and fineness of grain affect also to a considerable extent, their relative fusibility. These clays belong to the group of the so-called No. 2 refractories, and offer possibilities of being satisfactory unless the low point of vitrification is objectionable. They seem also to be adapted to the manufacture of stoneware and terra cotta, besides the manufacture of No. 2 fire brick.

The fusibility periods of samples H 44, H 45, and H 46 place them in the No. 2 refractory class. All seem to be of possible use for second grade fire brick. H 44 burns too coarse for use in pottery, but H 45 and H 46 seem of possible value for stoneware, terra cotta and No. 2 fire brick.

Stone

SANDSTONE

The sandstone at or near the base of the Pennsylvanian affords a fairly good building stone in places, though in many localities it is too massive or too irregularly bedded to be easily quarried. Considerable sandstone was taken from quarries only a few feet above East Fork, 2 miles northwest of Macomb, a number of years ago. Part of this was massive, grayish buff to white, and 7 to 12 feet thick. The upper part was more thinly bedded and was often pried up in slabs 1 to 3 feet thick. The stone was durable and was used for foundation walls, well curbing, flagging, and similar purposes. At one time a factory was in operation for the manufacture of grindstones and a number were shipped to various parts of the country. Some stone has also been taken from a small quarry in the southeastern corner of the Macomb quadrangle (SE. ¼ sec. 4, T. 3 N., R. 1 W.), where there are 20 feet of drab, thick-bedded sandstone. Small quantities of sandstone have also been derived from outcrops near Colchester and elsewhere.

LIMESTONE

The only quarries that have furnished much stone in recent years are in Mississippian beds. The upper part of the crystalline limestone beds of the Keokuk yield a fine quality of building stone, the chief objection to them being a slight tendency to split after long exposure to atmospheric agencies. There is little demand for building stone except for foundations and curbing, so that most of the rock used is crushed for concrete material and road metal. The best stone lies in the interval about 20 feet thick lying about 10 feet below the top of the limestone, the material above that being cherty and thinly and irregularly bedded and that below containing a very large proportion of chert. Most of the ledges are less than 2 feet thick and can be easily separated along thin clay partings. These beds have been quarried in several places, but in only two recently: (1) at the end of the bridge over Brunce's Creek, 2 miles northwest of Plymouth (NE. ¼ NW. ¼ sec. 26, map number 60) and (2) 1½ miles north of Plymouth (NE. ¼ NW. ¼ sec. 25, map number 61). At the latter place there is a small crusher and the following section is exposed:

Section in a quarry, NE. ¼ NW. ¼ sec. 25, T. 3 N., R. 5 W.

Description of strata	Thickness *Ft.*	*in.*
6. Limestone, bluish gray, crystalline, small lenses of chert, in beds of 8 inches or less with shale partings of 5 inches or less. Several good quarry layers, though thin	13	..
5. Limestone, in one bed, a little chert	..	12–16
4. Limestone, one bed, a very little chert	2	1
3. Limestone, thin-bedded, with shale partings	..	10
2. Limestone, one bed, no chert	1	11
1. Limestone, one bed, no chert	1	3

Crushed rock can also be obtained from the St. Louis limestone, but with difficulty. Several of the impure limestone beds that lie 30 feet and less below the St. Louis contain a durable stone for building purposes. Considerable rock has been taken from one of these beds 3 miles northwest of St. Marys (SW. ¼ SE. ¼ sec. 33, T. 5 N., R. 5 W., map number 62), where there are 15 feet of bluish-buff, argillaceous, thick-bedded limestone that weathers yellowish.

Sand and Gravel

Sand and some gravel can be obtained from the beds of many creeks and their tributaries, the former having been derived from the sandy deposits at or near the base of the glacial deposits, and the latter from pebbles in the main body of the till. It would also be possible to obtain remarkably pure sand on a large scale by stripping. On Spring Creek, 4 miles northwest of Macomb (SW. ¼ NE. ¼ sec. 28), there are exposed in a road cut 31 feet of orange and white sand that is composed almost entirely of equidimensional quartz grains. There are probably 17 feet more of this sand between the base of the cut and the level of the creek, a total of 48 feet of excellent material. Other notable sand deposits may be found in the northwestern corners of the Macomb and Colchester quadrangles and on and near Troublesome Creek. Near the head of a small draw, 2 miles northeast of Fountain Green (SW. ¼ NE. ¼ sec. 26, T. 6 N., R. 5 W.), there are at least 25 feet of pure, white and yellow, quartz sand bearing a few quartz and flint pebbles. This deposit could be removed very cheaply.

Glass Sand

Considerable attention has been drawn to the possibility of the basal sandstone of the Pennsylvanian being available as a glass sand, and privately conducted tests are said to have been satisfactory. This member is 20 feet or more thick in a number of places and consists of translucent, angular, quartz grains of medium and uniform size, with flakes of muscovite and a few small crystals of zircon, apatite, and other minerals. When fresh it is commonly nearly white, but has a thin reddish to dark-colored coating on exposed surfaces, apparently because of oxidized iron. This rock is suitable for the manufacture of green bottle glass, and limestone (the St. Louis) that could be used with it in the batch is also available. It is doubtful, however, whether these deposits could compete with the St. Peter sandstone now extensively used in north-central Illinois and east-central Missouri, as the expense of quarrying and grinding would be greater and the glass produced probably restricted to only a few varieties.

Lime

The brecciated St. Louis limestone, 25 feet and less thick, is a superior stone for the manufacture of lime, as it contains a very high percentage of

calcium carbonate. The Keokuk limestone can also be used, though its percentage of impurities is slightly higher and more variable.

Cement

The properties of limestone and clay essential for the successful production of Portland cement have been fully described in Bulletin No 17 of this Survey and in other reports and need not be mentioned here. There are in Bulletin 17 a number of analyses of St. Louis, Spergen ("Salem"), and Keokuk limestones that show that they are in greater part suitable for cement. There are only a few suitable clay or shale deposits outcropping near Keokuk limestone exposures, but the St. Louis limestone and clay and shale from the Pottsville formation could be obtained from adjacent pits near Colchester and Tennessee. The shale in the upper part of the Pottsville and that above coal No. 2 could be used where not too sandy. The clays at the stoneware-clay horizon are low in fluxes and might require too high a temperature for practical working purposes. Chemical analyses of these clays, already given in the section devoted to refractory clay tests, show that those from north of Macomb (H 44, H 45, and H 46) have a ratio of silica to alumina of more than 5 and are too high in silica, that one from Colchester (H 43) has a ratio of only 1.9 and is too low in silica, and that one from Colchester and one from Tennessee (H 41 and H 42) have ratios of about 3 and hence contain the two substances in proper proportion. The proportion of silica to alumina may, however, be modified by the composition of the limestone. For instance if used with a siliceous limestone the clay may have a lower silica-to-alumina ratio than if used with a pure limestone.

Iron, Zinc, and Other Metals

Ferruginous nodules are common in the Pennsylvanian shales, and layers of iron carbonate appear at several horizons in the Pottsville formation. Worthen states that some of these layers in Schuyler County yielded 52 per cent protoxide of iron. None of them is more than 6 inches thick, however, and there is little probability that workable deposits exist.

Persistent rumors of the presence of zinc and lead ore have caused considerable comment in this region, but no valuable deposits were found by the writer. Attention has been drawn chiefly to outcrops in a tributary of Grindstone Creek near the west boundary of the Macomb quadrangle (SW. ¼ sec. 28, T. 4 N., R. 3 W.), where small quantities of both lead and zinc ore minerals are reported to have been found. On this land blue-black shale about 10 feet thick lies 30 to 40 feet below the horizon of coal No. 2 and is separated from the St. Louis limestone by a few feet of sandstone. This shale bears one or two thin concretionary layers of dark-blue clay ironstone covered with a bright-red coating on weathered surfaces.

The interiors of many concretions are filled with crystals of sphalerite (zinc blend or "black jack"), apparently deposited in shrinkage fissures. At this same horizon, which is approximately that of the stoneware clays of the Pottsville, there are similar occurrences of sphalerite in several localities, but none that is sufficiently extensive to be of economic importance.

Native copper and even gold and other valuable minerals are frequently found associated with the pebbles and boulders of the glacial till and among the stream gravels. As the ledges from which these rocks were derived lie far to the north, beyond the State boundaries, the discoveries have no economic significance beyond the intrinsic value of the individual specimen. The geodes contain a great variety of minerals lining the hollow interiors. These minerals include quartz, calcite, sphalerite, iron pyrites, and others, but have no value except for museum or cabinet specimens.

Oil and Gas

Pockets of gas in sandy portions of the surface deposits are quite common in Illinois, and several have been found in this region. These accumulations are derived probably from the decomposition of vegetal matter in the surface deposits themselves and do not have any necessary connection with deep-seated oil or gas. They can be used to heat and light a few houses, but the yield is too small for commercial purposes. G. E. Flint bored two wells at opposite corners of his house, 5 miles south of Colchester (SE. ¼ NE. ¼ sec. 6, T. 4 N., R. 3 W.), each 87 feet in glacial clay and with sand at the bottom. Gas came from the sand under considerable pressure and was used for cooking and lighting in Mr. Flint's house for more than two years, until the wells became choked with sand. A well at the Price and Gunning clay plant at Industry is reported to have struck gas at a depth of 90 feet that was under sufficient pressure to throw mud 20 feet into the air. A few other wells in the region have encountered small quantities of gas at shallow depths, presumably in surface deposits. Complete and detailed reports on the deep drilling for oil and gas in the Colchester and Macomb quadrangles may be found in Bulletins 23[4] and 31[5] of the Illinois State Geological Survey.

[4]Hinds, Henry, Oil and gas in the Colchester and Macomb quadrangles: Ill. State Geol. Survey Bull. 23, 1917.

[5]Morse, W. C., and Kay, F. H., The Colmar oil field: Ill. State Geol. Survey Bull. 31, 1915.

RELATIONS OF LOESS AND DRIFT IN CANTON QUADRANGLE

By T. E. Savage

OUTLINE

ILLUSTRATIONS

INTRODUCTION

A knowledge of the relations of the loess to the drift sheet over which it lies in any region is a matter of great importance to the proper understanding of the age of the loess and of the conditions under which it was laid down. In connection with the field study of the geology of the Canton quadrangle, an effort was made to determine the relations which the loess sustains to the surface of the Illinoian drift upon which it rests in this area, and to learn whether certain low-lying deposits of loess are original or secondary. Figure 8A shows a typical loess bluff along the Mississippi.

The altitude of the upper surface of the drift, and thus of the lower surface of the loess, was obtained at a large number of places to determine whether the surface of the drift sheet was a nearly level plain, or whether it had considerable relief, at the time the loess mantle was spread upon it. Possible sources of the low-lying loess were then considered.

RELATIONS OF LOESS AND DRIFT

Pre-loessial Surface

The altitudes of the top or highest level at which the drift was found at different points are shown on the accompanying map (Pl. III). They were mostly obtained from leveling up from the outcrop of the loess-drift contact to bench marks, or other points the elevations of which could be

definitely determined from the topographic map. A few were obtained from aneroid readings, the aneroid being checked with nearby bench marks. A few others were obtained from the records of water wells in which the depth to the top of the drift was definitely known. In general the figures

FIG. 8.—Bluff of loess along Mississippi River in Calhoun County, Illinois.

indicate the highest elevation at which the drift was found in those places. In order that no exposure should be considered in which the loess was of doubtful character, no outcrops were included in this study in which the

thickness of the fine-grained pebbleless material above the drift did not exceed two feet.

It may be seen from the figures on the map (Pl. III) showing the elevation above sea level of the top of the drift beneath the loess in different places in the quadrangle, that the pre-loessial relief of the area was more than 150 feet. The general slope of the top of the drift, beneath the loess, in this region corresponds quite closely to the present slope of the surface. The main divide of the region in pre-loessial time, as at present, extended eastward from near the middle of the west side of the quadrangle, past the town of Fairview, and thence a little north of east between Farmington and Norris. From this highland the surface declined southward along Copperas Creek as much as 100 feet in a distance of 6 miles. Along the course of Big Creek, from its sources in the vicinity of Norris to the town of St. David, the total difference in the elevation of the drift surface beneath the loess exceeds 125 feet. From the headwaters of Put Creek, to the place where it leaves the quadrangle near the southwest corner, the drift surface beneath the loess declines more than 100 feet. A like difference in the altitude of the upper surface of the drift is shown between the headwaters of Turkey and Coal creeks and the places where they leave the west border of the quadrangle. From the sources of Littler's Creek to its junction with Spoon River, the pre-loessial drift surface declined as much as 150 feet.

Loess and Drift on Valley Slopes

It may also be seen from the map (Pl. III), at places designated by blue figures, that the altitude of the upper limit of the drift, or the lower limit of the loess, on the opposite sides of the same stream at different places is not the same, but shows variations in the following ways: (1) the base of the loess on opposite sides of the stream channel may be at about the same altitude, and the loess does not continue down the slope below the uppermost exposed level of the drift on either side; (2) the base of the loess on one side of the valley may be several feet lower than it is on the opposite side, but on neither side extends below the uppermost exposed limit of the drift; (3) the loess may continue down the slope on one side of the valley several feet lower than the upper limit of the drift exposed near the top of the hill, extending almost or entirely to the level of the flood plain.

Good exposures illustrating condition No. 1 may be seen in the following places:

1. Where the wagon road crosses Copperas Creek a short distance east of Brereton.
2. Where the wagon road crosses Put Creek, near the middle of sec. 4, T. 6 N., R. 3 E.
3. Where the wagon road crosses Coal Creek, SE. ¼ sec. 16, T. 8 N., R. 3 E.

Outcrops illustrating condition No. 2 may be seen:

4. Where the wagon road crosses the creek one-half mile south of Rapatee.
5. Where the wagon road crosses Littler's Creek along the east side of sec. 36, T. 9 N., R. 3 E.
6. Where the wagon road crosses Put Creek in the SE. ¼ sec. 6, and along the NE. side of sec. 7, T. 6 N., R. 3 E.

In all the above-mentioned localities the loess breaks off abruptly at the top of the hill and does not extend down the slope below the level of the highest exposure of the drift. In such places the banks are usually rather steep, and have been undercut by the streams in the process of valley widening since the main body of the loess in this region was deposited.

Conditions described under No. 3 are exposed in many places, of which the following are representative:

7. On the east side of Big Creek, near the middle of the N. ½ sec. 9, T. 6 N., R. 4 E.
8. On the east side of Put Creek, in the SE. ¼ sec. 5, T. 6 N., R. 3 E.
9. On the south side of Coal Creek, near the middle of sec. 19, T. 8 N., R. 3 E.

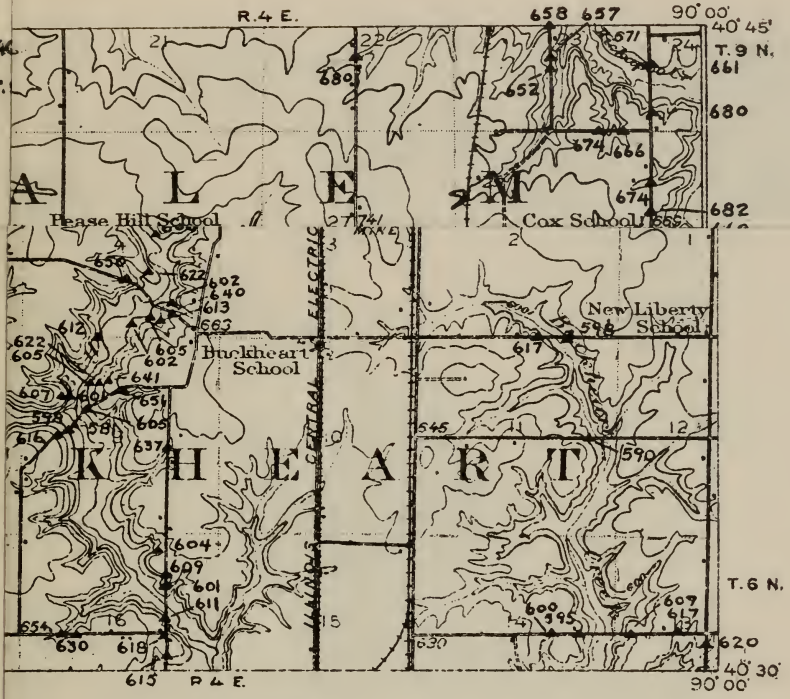
In the above-mentioned places the loess continues down the hill nearly or entirely to the level of the flood plain, covering the drift over the slope to a varying thickness of from 3 to 5 or 6 feet. It is usually thickest on the crest of the hill; the thickness gradually decreasing from the top toward the bottom. Over areas of considerable size as in the vicinity of Spoon River in secs. 19 and 20, T. 9 N., R. 3 E., and in sec. 24, T. 9 N., R. 2 E., loess and sand cover the slopes.

The places where the loess continues down the hills some distance below the uppermost level of the drift are always on the east or south banks of the larger streams. In such places the slopes are also rather gentle and the adjacent flood-plain areas have considerable width.

Significance of Relations

In the places where the loess breaks off abruptly near the top of the hill and does not extend down the slope below the level of the top of the drift, it is thought that the streams have undercut their banks and thus widened their valleys since the time of major deposition of the loess. In this process the loess that was deposited on the earlier slopes was removed as the work of valley widening by side cutting of the streams was accomplished. At these localities the undercutting has taken place so recently that the banks are still steep, and no appreciable amount of loess has since been deposited upon them.

In most places where the loess continues down the hills for a considerable distance below the top of the drift, the slopes are long and gentle, a condition that indicates that undercutting has not been in progress there for a long time.


R.4 E.
90° 00'
40° 45'
T. 9 N.
ALEXAM
Pease Hill School
Cox School
New Liberty School
Buckheart School
CENTRAL ELECTRIC
KHEART
T. 6 N.
40° 30'
90° 00'
R 4 E.
▲ Outcrop
● Drill hole
678 Elevation of loess-drift contact

it.

There are two possible ways in which the presence of the loess over the slopes below the top of the drift may be explained: (1) The loess may be assumed to have been brought down from higher levels by slumping and sheet wash; and (2) it may be assumed to have been carried up by the winds from adjacent flood-plain areas and deposited on the slopes where it is now found. By the first assumption practically all the loess on such slopes would be of secondary origin; whereas by the second, the loess would be largely in its original position.

The first hypothesis is thought to be inadequate, although slumpings or landslides are very common along the steeper slopes in this region, especially in places where the drift rests upon Pennsylvanian shale. Such slides or slumps were doubtless important factors in the development of gentle slopes after the undercutting of the streams was discontinued. Almost everywhere that the slides have occurred in recent time, both the loess and the underlying drift are involved, the slips extending down several feet below the base of the loess. These landslides result in a series of step-like offsets along the slopes from 5 or 6 feet to as much as 16 or 18 feet high. In the development of a rather uniform incline from such a terraced series of slipped masses, typical loess-covered slopes are not now being produced, for as the materials are washed down from the steep walls away from which the slipped masses have moved and lodge on the flat tops of the slumped bodies, there is a rather intimate mixing of loess with drift. Thus the material in the upper portion of these slopes comes to consist of fine and coarse particles and occasional pebbles derived from the loess and from the drift. It certainly should not be classed as normal loess.

If it is assumed that the loess over the slopes was brought down from the hill tops after the gradual slopes had been developed by sheet wash and by slips, which did not extend so deep as the drift, there is encountered the difficulty of finding the place from which the loess was removed. The thickness of the loess at the tops of the hills is just as great in the places where it continues down the slope to the floodplain, as it is in the places where it does not extend below the highest level of the drift. An immense quantity of material would be required to cover a slope one-eighth to one-half mile in length, to a depth from 3 to 6 feet; yet there is no trace of diminution in the thickness or amount of loess at the tops of the hills in such localities.

Supporting the view that the loess occurring on the slopes below the highest level of the drift is largely an original deposit, is the position of such slopes related to the flood-plains of streams and to the prevailing winds. Such loess deposits in the quadrangle are found only on the east and south or southeast banks of the larger streams. Thus the westerly or northwesterly winds would blow for some distance over a river flat of considerable width before they encounter the opposing bank where such deposits are

found. In the vicinity of Spoon River near the northwest corner of the quadrangle, the pebbleless material that covers the drift consists of sand as well as loess. The only adequate source of sand that can be seen in this region is the adjacent flood-plain of Spoon River to the westward, and this sandy alluvium would yield an abundant supply both of sand and finer loess material. There seems no doubt that the sand and loess occurring above the drift over the slopes and on the tops of the hills to the east and south of the valley of Spoon River were gathered by winds from the flood-plain of this river and deposited over the slopes where they now occur.

The general conditions in the vicinity of loess-covered slopes in other portions of the quadrangle are very similar to those that obtain in the vicinity of Spoon River. The similarity extends to the gentle character of the slopes; to the position of the slopes on the east or south banks of the larger streams; to areas of flood-plain favorable for the supply of the loess material; and to the relations of the loess to the underlying drift. These facts together with the lack of any trace of removal or diminution in the quantity of the loess material at the tops of the hills in such places, make it practically certain that the loess occurring on the slopes below the uppermost level of the drift has been mostly deposited by winds since the present gentle gradient of the slopes was developed, and that it is largely in its original position.

DICTIONARY OF ALTITUDES IN ILLINOIS

(Compiled in cooperation with the U. S. Geological Survey)

The purpose of the following list is primarily to describe the elevations above sea level shown on the base map of Illinois published by the Illinois State Geological Survey, the latest edition being that of 1914. As several quadrangles have been carefully surveyed since that date, this list substitutes the more exact elevations established at the towns in these areas and contains all corrections and new data available up to January 1, 1917.

By far the larger number of the elevations given in the following list are derived from the careful study of railroad profiles, and their adjustment to lines of levels run by surveys. In this adjustment the intersections of the railroads with one another have been used to the fullest possible extent. Nearly every railroad in the State is represented, and most of them by a very complete list of heights. Unless otherwise specified the altitude of a town determined from a railroad profile is that of the track opposite the passenger station.

The exact elevations in this list are those determined by the U. S. Geological Survey and Illinois State Geological Survey in cooperation (U. S. G. S.), the Coast and Geodetic Survey (C. and G. S.), the U. S. Engineer Corps, (Engineer Corps), the Mississippi River Commission (Miss. River Com.), and the U. S. Lake Survey (U. S. L. S.) Most of the U. S. Geological Survey elevations used here and on the base map are the regular bench marks that consist of bronze or aluminum tablets on buildings or iron posts driven deeply into the ground. These are absolutely permanent, and by law can not be destroyed or disturbed. In certain towns along the lines of levels run by the Survey no bench marks have been established, but exact elevations of the top of the rail in front of the stations have been accurately determined. In each of such cases this rail elevation has been chosen for the altitudes for use in those towns, but it must be understood that this figure is subject to slight error, as this is not a permanently established mark. *Three-place figures are only approximate.*

Abbreviations of names of railroads

A. T. & S. F. Ry.....Atchison, Topeka and Santa Fe Railway
B. & O. R. R.....Baltimore and Ohio Railroad
C. I. & S. R. R.....Chicago, Indiana and Southern Railroad
C. B. & Q. Ry.....Chicago, Burlington & Quincy Railway
C. C. & L. R. R.....Chicago, Cincinnati and Louisville Railroad
C. I. & L. Ry.....Chicago, Indianapolis and Louisville Railway
C. G. W. Ry.....Chicago Great Western Railway

Abbreviations of names of railroads—Concluded

C. M. & St. P. Ry.....Chicago, Milwaukee and St. Paul Railway
C. H. & D. Ry.....Cincinnati, Hamilton and Dayton Railway
C. & E. I. R. R.....Chicago and Eastern Illinois Railroad
C. S. Ry.....Chicago Southern Railway
C. & I. M. Ry.....Chicago and Illinois Midland Railway
C. I. & S. R. R.....Chicago, Indiana and Southern Railroad
C. & W. I. R. R.....Chicago and Western Indiana Railroad
C. P. & St. L. Ry.....Chicago, Peoria and St. Louis Railway
C. P. & W. Ry.....Chicago, Peoria and Western Railway
C. R. I. & P. Ry.....Chicago, Rock Island and Pacific Railway
C. & N. W. Ry.....Chicago and North Western Railway
C. & A. Ry.....Chicago and Alton Railway
C. C. C. & St. L. Ry...Cleveland, Cincinnati, Chicago and St. Louis Railway
D. R. I. & N. W. Ry..Davenport, Rock Island and Northwestern Railway
E. J. & E. Ry.....Elgin, Joliet and Eastern Railway
G. T. Ry.....Grand Trunk Railway
Ia. C. Ry.....Iowa Central Railway
I. S. Ry.....Illinois Southern Railway
I. C. R. R.....Illinois Central Railroad
L. E. & W. R. R.....Lake Erie and Western Railroad
L. S. & M. S. Ry.....Lake Shore and Michigan Southern Railway
L. & N. R. R.....Louisville and Nashville Railroad
L. & M. Ry.....Litchfield and Madison Railway
M. C. R. R.....Michigan Central Railroad
M. & O. R. R.....Mobile and Ohio Railroad
N. Y. C. & St. L. R. R..New York, Chicago and St. Louis Railroad
Pa. Co.....Pennsylvania Company
P. C. C. & St. L. Ry....Pittsburgh, Cincinnati, Chicago & St. Louis Railway
P. & P. U. Ry.....Peoria and Pekin Union Railway
Q. O. & K. C. R. R.....Quincy, Omaha and Kansas City Railroad
So. Ry.....Southern Railway
St. L. I. M. & S. Ry....St. Louis, Iron Mountain & Southern Railway
St. L. S. W. Ry.....St. Louis Southwestern Railway
T. St. L. & W. R. R....Toledo, St. Louis and Western Railroad
T. P. & W. Ry.....Toledo, Peoria and Western Railway
Van. R. R.....Vandalia Railroad
W. R. R.....Wabash Railroad
W. C. & W. R. R.....Wabash, Chester and Western Railroad
W. C. Ry.....Wisconsin Central Railway

Altitudes of towns in Illinois

Town or city	Authority	Elevation above sea level
		Feet
Abingdon	C. B. & Q. Ry.	728
Adair	C. B. & Q. Ry.	647
Addieville	L. & N. R. R.	467
Addison	I. C. R. R.	689
Adeline, copper bolt in foundation of elevator.	C. and G. S.	750.933

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Adrian	C. B. & Q. Ry.	705
Advance	C. H. & D. Ry.	581
Albany, copper bolt in foundation of Harper and Son's building	C. and G. S.	595.968
Albers, tablet on Louis Foytman's house	C. and G. S.	444.477
Albion	So. Ry.	447
Alderson	I. C. R. R.	481
Aldridge	I. C. R. R.	360
Aledo	C. B. & Q. Ry.	739
Alexis, top of rail in front of station	U. S. G. S.	695.13
Alhambra	I. C. R. R.	566
Allendale	C. C. C. & St. L. Ry.	456
Allentown	Van. R. R.	681
Allenville	I. C. R. R.	654
Allerton, Vermilion County	C. & E. I. R. R.	698
Almora	C. M. & St. P. Ry.	838
Alpha, iron post 600 feet north of station	U. S. G. S.	806.038
Alpine	W. R. R.	697
Alsey	C. B. & Q. Ry.	637
Alta	C. R. I. & P. Ry.	751
Altamont	Van. R. R.	623
Alton, copper bolt in doorstep of German Catholic Church	C. and G. S.	486.740
Altona	C. B. & Q. Ry.	759
Alto Pass	M. & O. R. R.	748
Alvin	C. & E. I. R. R.	663
Alworth	I. C. R. R.	896
Amboy	C. B. & Q. Ry.	752
America	C. C. C. & St. L. Ry.	350
Anchor	I. C. R. R.	776
Ancona	A. T. & S. F. Ry.	630
Andalusia, tablet on step of Baptist Church	U. S. G. S.	567.586
Anderson	C. & A. Ry.	645
Andrew, top of west rail in front of station C. P. & St. L. Ry	U. S. G. S.	583.9
Anna, square cavity in window-sill on front of Otrich's drug store	C. and G. S.	629.421
Annawan	C. R. I. & P. Ry.	626
Antioch, Lake County	W. C. R. R.	770
Apple River, tablet on concrete walk, at NE. corner Railroad and Main streets	U. S. G. S.	995.536
Appleton	A. T. & S. F. Ry.	606
Arcola	Van. R. R.	681
Arenzville	C. B. & Q. Ry.	487
Argenta	I. C. R. R.	690
Argo	C. M. & St. P. Ry.	644
Arlington	C. B. & Q. Ry.	762

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Arlington Heights, tablet on old high school	U. S. G. S.	703.820
Armstrong	I. C. R. R.	711
Aroma	C. C. C. & St. L. Ry.	619
Arpee	C. B. & Q. Ry.	579
Arrowsmith	L. E. & W. R. R.	878
Arthur	Van. R. R.	666
Ashgrove, geodetic station	U. S. L. S.	666
Ashkum	I. C. R. R.	670
Ashland	C. & A. Ry.	638
Ashley, capstone of southeast wall of I. C. R. R. culvert No. 212 near alley	C. and G. S.	558.765
Ashmore	C. C. C. & St. L. Ry.	693
Ashton	C. & N. W. Ry.	817
Assumption	I. C. R. R.	644
Astoria	C. B. & Q. Ry.	662
Athens, tablet on city hall	U. S. G. S.	605.783
Atkinson	C. R. I. & P. Ry.	647
Atlanta	C. & A. Ry.	720
Atterberry, tablet on Koppleen's elevator	U. S. G. S.	601.764
Attila, iron post at two-story church	U. S. G. S.	557.930
Atwater	C. B. & Q. Ry.	635
Atwood	C. H. & D. Ry.	667
Auburn	C. & A. Ry.	628
Augusta	C. B. & Q. Ry.	672
Ava, iron post in station grounds	U. S. G. S.	604.835
Avon, iron post and street intersection at SW. cor. NW. ¼ SE. ¼ sec. 19, T. 8 N., R. 1 E.	U. S. G. S.	640.925
Ayers	C. B. & Q. Ry.	586
Bader	C. B. & Q. Ry.	609
Baileyville	I. C. R. R.	923
Baker	C. B. & Q. Ry.	679
Baldwin	M. & O. R. R.	455
Barclay	I. C. R. R.	560
Barco	I. C. R. R.	420
Bardolph	C. B. & Q. Ry.	668
Barnes	I. C. R. R.	865
Barnett	C. B. & Q. Ry.	656
Barnhill	B. & O. R. R.	386
Barrington	C. & N. W. Ry.	824
Barrow	C. B. & Q. Ry.	659
Barry	W. R. R.	680
Barstow	C. B. & Q. Ry.	587
Bartelso, iron post near H. F. Johnson's saloon	U. S. G. S.	449.572
Bartlett, copper bolt in east foundation of Congregational Church (U. S. E. C. B. M. 89)	C. and G. S.	804.055

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Basco	C. B. & Q. Ry.	650
Batavia	C. B. & Q. Ry.	719
Bates	W. R. R.	643
Bath, pipe in Public Square	Engineer Corps	462
Baxter	C. & E. I. R. R.	610
Bayle City	T. St. L. & W. R. R.	617
Baylis	W. R. R.	878
Beardstown, copper bolt in door-sill at entrance to Odd Fellows building	C. and G. S.	444.351
Bearsdale	I. C. R. R.	687
Beaucoup	L. & N. R. R.	538
Beecher	C. & E. I. R. R.	723
Beecher City	B. & O. R. R.	595
Belknap, iron post 120 feet west of station	U. S. G. S.	347.021
Bellair, iron post at road forks northwest of village	U. S. G. S.	549.641
Belle Rive	L. & N. R. R.	475
Bellmont, tablet on town hall	U. S. G. S.	431.246
Belvidere	C. & N. W. Ry.	783
Bement	W. R. R.	689
Bennett	C. & E. I. R. R.	656
Bensenville, copper bolt in foundation of C. A. Franz's store	C. and G. S.	681.157
Benson	A. T. & S. F. Ry.	765
Bentley	W. R. R.	671
Benton, Franklin County, tablet on Court House	U. S. G. S.	475.814
Berdan	C. & A. Ry.	512
Berlin, tablet on schoolhouse	U. S. G. S.	640.158
Bernice	P. C. C. & St. L. Ry.	600
Berry	B. & O. R. R.	585
Berwick	Ia. C. Ry.	715
Bethalto	C. C. C. & St. L. Ry.	521
Bethany	I. C. R. R.	655
Biggs	I. C. R. R.	501
Biggsville	C. B. & Q. Ry.	642
Big Rock	C. B. & Q. Ry.	710
Billet, iron post 75 feet northwest of station	U. S. G. S.	424.203
Bingham	T. St. L. & W. R. R.	600
Binney, crossing C. C. C. & St. L. Ry	I. C. R. R.	620
Birds	U. S. G. S.	439
Birds Bridge	C. R. I. & P. Ry.	546
Birkbek	I. C. R. R.	748
Birkner	L. & N. R. R.	568
Bishop	C. P. & St. L. R. R.	500
Bishop Hill	C. R. I. & P. Ry.	786
Bismark	C. & E. I. R. R.	666

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Bissell	I. C. R. R.	576
Blacks	W. R. R.	728
Blackstone	C. & A. Ry.	738
Blanding, iron post opposite general store	U. S. G. S.	631
Blandinsville, iron post 700 feet east of station	U. S. G. S.	732.734
Block	C. & E. I. R. R.	715
Blodgett	A. T. & S. F. Ry.	524
Bloomfield, iron post 150 feet west of post-office	U. S. G. S.	430.771
Bloomingdale, tablet on Kolbusch and Hauseminn's store	U. S. G. S.	771
Bloomington, tablet on Court House	U. S. G. S.	829.800
Blue Island	C. R. I. & P. Ry.	605
Blue Mound	W. R. R.	620
Blue Point	W. R. R.	637
Blue Ridge	W. R. R.	788
Bluffs	W. R. R.	467
Bluff Springs	B. & O. R. R.	457
Bluford	So. Ry.	514
Boaz	C. & E. I. R. R.	352
Bolivia	C. H. & D. Ry.	604
Bolton	C. G. W. Ry.	817
Bondville, top of north rail in front of station I. C. R. R.	U. S. G. S.	716.2
Bongard	C. & E. I. R. R.	678
Bonnie	C. & E. I. R. R.	425
Boody	C. H. & D. Ry.	668
Boos, top of rail in front of station I. C. R. R.	U. S. G. S.	517.4
Borton, top of rail at station and crossing of Vandalia and C. H. & D. Rys	U. S. G. S.	664.9
Bosky Dell	I. C. R. R.	412
Boulder	C. B. & Q. Ry.	462
Bourbon	C. & E. I. R. R.	664
Bowen	W. R. R.	693
Bowes	I. C. R. R.	850
Bowman	T. St. L. & W. R. R.	675
Boyleston	So. Ry.	427
Braceville	C. & A. Ry.	583
Bradbury	I. C. R. R.	610
Bradford	C. B. & Q. Ry.	800
Bradfordtown	B. & O. R. R.	565
Braidwood	C. & A. Ry.	581
Breckenridge	B. & O. R. R.	584
Breeds	T. P. & W. R. R.	488
Breese, tablet on St. Dominic school	U. S. G. S.	458.120
Brewer	C. & E. I. R. R.	650
Brewster	C. B. & Q. Ry.	448

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Briar Bluff	C. B. & Q. Ry.	588
Bridgeport, tablet on F. W. Cox's yellow brick building	U. S. G. S.	448.591
Brighton	C. & A. Ry.	667
Brimfield	C. B. & Q. Ry.	729
Brisbane	E. J. & E. Ry.	685
Bristol	C. B. & Q. Ry.	646
Broadlands	C. & E. I. R. R.	680
Broadwell	C. & A. Ry.	592
Brocton, top of rail at junction T. St. L. & W. and C. H. & D. Rys	U. S. G. S.	662.7
Brokaw	L. E. & W. R. R.	857
Brookport	I. C. R. R.	338
Brothers	C. & E. I. R. R.	654
Broughton, iron post at L. & N. R. R. Station	U. S. G. S.	378.546
Brownfield	I. C. R. R.	344
Browning	C. B. & Q. Ry.	450
Browns, tablet on Methodist Episcopal Church	U. S. G. S.	402.128
Brownsburg	St. L. I. M. & S. Ry.	399
Brownstown	Van. R. R.	589
Brownsville, iron post at railroad station	U. S. G. S.	416.528
Brubaker	C. & E. I. R. R.	582
Bruce	W. R. R.	644
Brush Junction	I. C. R. R.	390
Bryant	C. B. & Q. Ry.	624
Bryce	C. & E. I. R. R.	680
Buckingham	I. C. R. R.	655
Buckley	I. C. R. R.	702
Buda	C. B. & Q. Ry.	767
Budd	C. I. & S. R. R. Co.	705
Buena Vista	I. C. R. R.	781
Buffalo	W. R. R.	602
Buffalo Hart	I. C. R. R.	622
Buncombe, iron post 100 feet north of small reservoir at northeast edge of town	U. S. G. S.	507.9
Bunker Hill, tablet on monument	U. S. G. S.	668.582
Bureau Junction	C. R. I. & P. Ry.	480
Burlington	I. C. R. R.	924
Burnside	C. B. & Q. Ry.	665
Burrowsville	C. H. & D. Ry.	674
Burton View	I. C. R. R.	572
Bush	St. L. I. M. & S. Ry.	402
Bushnell, iron post in southeast cor. of West End Park	U. S. G. S.	655.991
Bushton, top of rail in front of station T. St. L. & W. R. R.	U. S. G. S.	672.6
Butler	C. C. C. & St. L. Ry.	626

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Byrneville	A. T. & S. F. Ry.	610
Byron, copper bolt in north wall of Commercial Hotel	C. and G. S.	729.482
Caberry	I. C. R. R.	700
Cable	C. R. I. & P. Ry.	672
Cadwell	C. & E. I. R. R.	670
Cahokia Ferry	M. & O. R. R.	407
Cairo, copper bolt in northeast wall of custom house	C. and G. S.	317.987
Caledonia	C. & N. W. Ry.	928
Calhoun	I. C. R. R.	530
Calvin, tablet on Union Church	U. S. G. S.	448.458
Camargo	C. H. & D. Ry.	650
Cambria	I. C. R. R.	429
Cambridge	C. R. I. & P. Ry.	812
Cameron	A. T. & S. F. Ry.	785
Campbell Hill	M. & O. R. R.	545
Camp Point, top of rail in front of station	U. S. G. S.	738.05
Campus	W. R. R.	653
Canton, tablet on high school	U. S. G. S.	654.906
Cantrall, tablet on Cooperative Coal Company's store	U. S. G. S.	596.181
Carbon Cliff	C. R. I. & P. Ry.	570
Carbondale, B. M. on sill of east window of Jacob Baird's store	C. and G. S.	415.625
Carlinville	C. & A. Ry.	627
Carlock	L. E. & W. R. R.	773
Carlton	C. & N. W. Ry.	887
Carlyle, iron post in Court House yard	U. S. G. S.	460.787
Carman	C. B. & Q. Ry.	537
Carmi, tablet on step of First Presbyterian Church	U. S. G. S.	398.777
Carpenter	C. & E. I. R. R.	540
Carriers Mills	C. C. C. & St. L. Ry.	392
Carrollton	C. & A. Ry.	625
Carthage	C. B. & Q. Ry.	678
Cary	C. & N. W. Ry.	811
Casey	Van. R. R.	648
Caseyville, station B. & O. R. R.	C. and G. S.	442
Casner	C. H. & D. Ry.	709
Cass	B. & O. R. R.	554
Castleton	C. B. & Q. Ry.	794
Catlin, iron post 195 feet north of station	U. S. G. S.	657.396
Caton	A. T. & S. F. Ry.	720
Catonfarm	E. J. & E. Ry.	624
Cayuga	C. & A. Ry.	696
Cazenovia	C. & A. Ry.	774

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Centerville	E. J. & E. Ry.	572
Centralia, B. M. on south windowsill of J. J. Pfaff & Co.'s drug store	C. and G. S.	494.600
Cerro Gordo	W. R. R.	745
Chadwick	C. B. & Q. Ry.	782
Chalfin Bridge, iron post at cross roads	U. S. G. S.	411.545
Champaign	I. C. R. R.	740
Chana	C. B. & Q. Ry.	782
Chandlerville, top of iron post in back yard of Mrs. S. L. B. Chandler's property	Engineer Corps	463.753
Channahon, bolt in coping of lock No. 7	Engineer Corps	522.144
Chapin	C. B. & Q. Ry.	631
Chapman	T. St. L. & W. R. R.	639
Charleston, tablet on Court House	U. S. G. S.	686.536
Charlotte	I. C. R. R.	668
Charter Grove	I. C. R. R.	875
Chatham	C. & A. Ry.	603
Chatsworth	T. P. & W. Ry.	736
Chatton	W. R. R.	715
Chauncey, iron post at northeast corner of crossroads	U. S. G. S.	488.708
Chebansee	I. C. R. R.	674
Cheneyville	L. E. & W. R. R.	722
Chenoa	C. & A. Ry.	722
Cherry Point	C. H. & D. Ry.	656
Cherry Valley	C. & N. W. Ry.	737
Chicago, copper bolt in doorsill of water tower chert's block	C. and G. S.	380.583
Chestervale	I. C. R. R.	613
Chesterville	Van. R. R.	657
Chestnut	I. C. R. R.	620
Chicago, copper bolt in doorsill of water power	C. and G. S.	598.479
Chicago Heights	E. J. & E. Ry.	694
Chillicothe, pipe near northwest corner of public square	Engineer Corps	489.873
Chipps	C. & E. I. R. R.	664
Chrisman	C. C. C. & St. L. Ry.	643
Christopher, tablet on Christopher National Bank	U. S. G. S.	443.855
Cisco	I. C. R. R.	692
Cisne	B. & O. R. R.	465
Cissna Junction	C. & E. I. R. R.	690
Cissna Park	C. & E. I. R. R.	684
Civer	T. P. & W. R. R.	675
Claremont, station crossing, top of south rail	U. S. G. S.	509.8
Clarence	L. E. & W. R. R.	762
Clarke City	I. C. R. R.	592

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Clarksburg	C. & E. I. R. R.	618
Clarksdale	W. R. R.	623
Clay City, B. M. on east abutment of R. R. bridge over Little Wabash River	C. and G. S.	428.660
Clayton, iron post in school yard	U. S. G. S.	721.474
Claytonville	C. & E. I. R. R.	665
Clements	C. & A. Ry.	703
Clifton	I. C. R. R.	672
Clinton, tablet on Court House step	U. S. G. S.	745.923
Cloverdale	I. C. R. R.	763
Clores	W. C. & W. R. R.	391
Coal City	E. J. & E. Ry.	562
Coal Valley, iron post 300 feet east of station	U. S. G. S.	629.932
Coatsburg, iron post 500 feet east of station and 100 feet north of track	U. S. G. S.	761.148
Coffeen	T. St. L. & W. R. R.	634
Colchester, point in cement walk at bank, one block north of C. B. & Q. Ry. station	U. S. G. S.	698.369
Coles	I. C. R. R.	657
Colfax	I. C. R. R.	750
Collinsville, iron post opposite Schmacker Bros'. saloon	U. S. G. S.	472.974
Collison	C. & E. I. R. R.	687
Colmar, iron post 100 feet west of town hall at foot of telephone post	U. S. G. S.	555.672
Colona	C. B. & Q. Ry.	598
Columbia	M. & O. R. R.	490
Colusa	C. B. & Q. Ry.	653
Colvin Park	I. C. R. R.	855
Comer	C. & A. Ry.	616
Compton	C. B. & Q. Ry.	970
Conant	W. C. & W. R. R.	480
Concord	C. B. & Q. Ry.	609
Congerville	L. E. & W. R. R.	742
Conlogue	C. C. C. & St. L. Ry.	722
Cooksville	I. C. R. R.	774
Cooper	A. T. & S. F. Ry.	816
Cordes	I. S. Ry.	507
Cordova, copper bolt in north wall of W. G. Marshall's elevator	C. and G. S.	595.356
Cornell	W. R. R.	629
Cornland	I. C. R. R.	584
Cortland	C. & N. W. Ry.	897
Coster	E. J. & E. Ry.	578
Coulterville	I. C. R. R.	545
Council Hill, tablet on Methodist Episcopal Church	U. S. G. S.	925.374
Covel	C. & A. Ry.	709

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Cowden	T. St. L. & W. R. R.	601
Cowling, iron post at R. R. station	U. S. G. S.	397.212
Coynes	E. J. & E. Ry.	634
Cramer	Ia. C. Ry.	765
Crampton	C. R. I. & P. Ry.	739
Crandall	A. T. & S. F. Ry.	750
Cravat	C. B. & Q. Ry.	555
Creal Springs	I. C. R. R.	504
Crescent City	T. P. & W. Ry.	637
Creston	C. & N. W. Ry.	903
Crete	C. & E. I. R. R.	724
Croft	C. & A. Ry.	604
Cropsey	I. C. R. R.	803
Crossville	C. C. C. & St. L. Ry.	414
Cruger	A. T. & S. F. Ry.	757
Crumbaugh	I. C. R. R.	785
Cuba	C. B. & Q. Ry.	679
Cullom	I. C. R. R.	689
Culton	I. C. R. R.	697
Curran	W. R. R.	620
Curtis	C. & A. Ry.	582
Cushman	W. R. R.	668
Custer Park	W. R. R.	566
Cutler	W. C. & W. R. R.	503
Cypress	C. & E. I. R. R.	372
Daggetts	C. B. & Q. Ry.	744
Dahinda	A. T. & S. F. Ry.	599
Dahlgren	L. & N. R. R.	508
Dakota	C. M. & St. P. Ry.	929
Dallas City	A. T. & S. F. Ry.	536
Dalton City	I. C. R. R.	672
Dana	A. T. & S. F. Ry.	691
Danforth	I. C. R. R.	658
Danvers, tablet on concrete platform of railroad station	U. S. G. S.	809.268
Danville, tablet on Court House	U. S. G. S.	601.499
Darmstadt	M. & O. R. R.	655
Daum	C. & A. Ry.	627
Davis, Stephenson County	C. M. & St. P. Ry.	902
Dawson	W. R. R.	597
Decatur, B. M. at crossing N. Main St. & Wabash Ry.	U. S. G. S.	682.429
Decorra	A. T. & S. F. Ry.	688
Deer Creek	L. E. & W. R. R.	755
Deerfield	C. M. & St. P. Ry.	685
Deer Grove	C. B. & Q. Ry.	653
Deer Park	C. B. & Q. Ry.	470

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Deers, iron post 70 feet north of post office...	U. S. G. S.	691.954
Dekalb	C. & N. W. Ry.	886
Delafield	L. & N. R. R.	427
Deland	I. C. R. R.	707
Delavan	C. & A. Ry.	605
Delhi	C. & A. Ry.	603
Dell Abbey	E. J. & E. Ry.	549
Delong	C. B. & Q. Ry.	679
Delrey	I. C. R. R.	669
Dennison	Van. R. R.	574
Denny	I. C. R. R.	417
Denrock	C. B. & Q. Ry.	609
Denver	W. R. R.	680
Depue	C. R. I. & P. Ry.	472
Desoto, B. M. on south abutment of R. R. bridge over Big Muddy Creek	C. and G. S.	385.672
Desplaines, tablet on town hall	U. S. G. S.	642.881
Dewey	I. C. R. R.	736
Dewitt	I. C. R. R.	745
Dexter	Van. R. R.	600
Diamond Lake	E. J. & E. Ry.	760
Dickerson	I. C. R. R.	757
Dieterich	I. C. R. R.	595
Dillsburg	I. C. R. R.	750
Dimmick	I. C. R. R.	664
Disco, iron post at north end of town at road and railroad crossing, 10 feet west of fence corner	U. S. G. S.	672.669
Divernon	I. C. R. R.	614
Divine	E. J. & E. Ry.	525
Dixon	I. C. R. R.	696
Dollville	C. & E. I. R. R.	683
Dolton	C. & E. I. R. R.	606
Dongola	I. C. R. R.	396
Donnellson	T. St. L. & W. R. R.	621
Donovan	C. C. C. & St. L. Ry.	670
Dora	Van. R. R.	684
Doran	I. C. R. R.	683
Dorchester	C. C. C. & St. L. Ry.	649
Dorsey	C. C. C. & St. L. Ry.	584
Douglas	C. B. & Q. Ry.	650
Downers Grove	C. B. & Q. Ry.	717
Downs, iron post 360 feet east of R. R. station	U. S. G. S.	794.255
Drake	C. & A. Ry.	546
Dresser	T. St. L. & W. R. R.	603
Drivers	L. & N. R. R.	443
Dudley	C. C. C. & St. L. Ry.	715

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Duncan	C. B. & Q. Ry.	663
Duncanville	C. C. C. & St. L. Ry.	515
Dundas, tablet on Dundas Rolling Mill	U. S. G. S.	481.292
Dunkel	I. C. R. R.	663
Dunlap	C. R. I. & P. Ry.	724
Dunn	I. C. R. R.	658
Dunning	C. M. & St. P. Ry.	643
Dupo	St. L. I. M. & S. Ry.	422
Duquoin, tablet on east wall of Exchange Bank	U. S. G. S.	468.427
Durand	C. M. & St. P. Ry.	774
Duval	C. & E. I. R. R.	675
Dwight	C. & A. Ry.	641
Earlville	C. B. & Q. Ry.	700
East Cape Girardeau	I. C. R. R.	345
East Carondelet	I. C. R. R.	415
East Dubuque, circle cut on west abutment of bridge of I. C. R. R. over C. B. & Q. Ry.	C. and G. S.	615.349
East Lynn	L. E. & W. R. R.	697
East Peoria	T. P. & W. Ry.	478
East St. Louis, plate on eastern pier of great bridge	C. and G. S.	413.973
Edelstein	A. T. & S. F. Ry.	781
Eden	Ia. C. Ry.	737
Edgar	C. C. C. & St. L. Ry.	645
Edgewood	B. & O. R. R.	570
Edinburg	B. & O. R. R.	594
Edwards	C. B. & Q. Ry.	519
Edwardsville	T. St. L. & W. R. R.	554
Effingham	Van. R. R.	591
Egan	C. G. W. Ry.	819
Elburn	C. & N. W. Ry.	848
Elco	M. & O. R. R.	373
Eldena	I. C. R. R.	805
Eldorado, iron post near Grand Hotel	U. S. G. S.	387.858
Eleanor	Ia. C. Ry.	685
Eleroy	I. C. R. R.	907
Elgin, bolt in north wall of Borden's condensed milk factory	U. S. G. S.	717.485
Elizabeth	C. G. W. Ry.	790
Elkhart, iron post at R. R. station	U. S. G. S.	592.492
Elkville, iron post at R. R. station	U. S. G. S.	400.509
Ellery	So. Ry.	418
Elliott	L. E. & W. R. R.	778
Ellis, Vermilion County	C. & E. I. R. R.	753
Ellisville, aluminum tablet on bridge over Spoon River	U. S. G. S.	517.480

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Ellisville Station, iron post 30 feet north of tank at station	U. S. G. S.	524.101
Ellsworth	L. E. & W. R. R.	864
Elmhurst	C. & N. W. Ry.	681
Elmwood	C. B. & Q. Ry.	626
El Paso	I. C. R. R.	749
Elvaston, top of rail at station of T. P. & W. Ry.	U. S. G. S.	674.74
Elwin	I. C. R. R.	718
Elwood	C. & A. R. R.	646
Emden	I. C. R. R.	590
Emery, tablet on concrete post near R. R. station	U. S. G. S.	688.832
Emington	W. R. R.	701
Empire, iron post 130 feet west of R. R. station	U. S. G. S.	755.58
Enfield	B. & O. R. R.	435
Enos	C. & A. Ry.	619
Eola	E. J. & E. Ry.	741
Epperson	C. B. & Q. Ry.	656
Equality, iron post at L. & N. R. R. station	U. S. G. S.	362.219
Erie, iron post in park	U. S. G. S.	588.435
Ernst	C. C. C. & St. L. Ry.	567
Esmond	C. G. W. Ry.	820
Essex	W. R. R.	588
Etherton	M. & O. R. R.	391
Etna	I. C. R. R.	658
Eureka	T. P. & W. Ry.	738
Evanston, tablet on entrance to city hall	U. S. G. S.	602.153
Evansville, tablet on concrete post near R. R. station	U. S. G. S.	414.375
Evarts	I. C. R. R.	840
Everett, top of rail in front of station C. M. & St. P. Ry.	U. S. G. S.	680.7
Ewbanks	C. B. & Q. Ry.	733
Eylar	I. C. R. R.	698
Fairbanks	Van. R. R.	684
Fairbury	T. P. & W. Ry.	686
Fairdale	C. M. & St. P. Ry.	787
Fairfield	B. & O. R. R.	451
Fairgrange, top of rail in front of station T. St. L. & W. R. R.	U. S. G. S.	683.1
Fairland	C. & E. I. R. R.	655
Fairman	I. C. R. R.	522
Fairmount, geodetic station	U. S. L. S.	704
Fairmount Junction, iron post near R. R. station	U. S. G. S.	654.522

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Fairview, iron post at cross roads 60 feet northeast of road intersection near station..	U. S. G. S.	733.173
Fall Creek	C. B. & Q. Ry.	451
Falmouth	I. C. R. R.	548
Fancher	T. St. L. & W. R. R.	612
Fancy Prairie	C. & A. Ry.	620
Farina	I. C. R. R.	578
Farmdale	Van. R. R.	537
Farmer City, iron post 375 feet east of junction of C. C. C. & St. L. Ry. and I. C. R. R.	U. S. G. S.	732.510
Farmersville	I. C. R. R.	638
Farmingdale	B. & O. R. R.	561
Farmington, tablet on new ward school	U. S. G. S.	741.533
Fayette	C. & A. Ry.	565
Fayville	C. & E. I. R. R.	337
Fenton, iron post near R. R. station	U. S. G. S.	602.458
Ferrell, top of rail in front of station Vandalia R. R.	U. S. G. S.	604.8
Ferris	T. P. & W. Ry.	685
Fiatt	C. B. & Q. Ry.	678
Ficklin	C. H. & D. Ry.	665
Fillmore	T. St. L. & W. R. R.	630
Filson	Van. R. R.	649
Findlay	C. & E. I. R. R.	676
Fisher	I. C. R. R.	732
Fithian	C. C. C. & St. L. Ry.	665
Flag Center	C. B. & Q. Ry.	830
Flagg	C. & N. W. Ry.	782
Flanagan	I. C. R. R.	676
Flat Rock	C. C. C. & St. L. Ry.	478
Flora, B. M. on windowsill of school house..	C. and G. S.	489.827
Floraville, iron post at southeast corner of school house at southeast edge of town	U. S. G. S.	527.640
Florence	C. M. & St. P. Ry.	848
Foosland	W. R. R.	734
Forrest, crossing W. R. R.	T. P. & W. Ry.	688
Forsyth, tablet on concrete post at R. R. station	U. S. G. S.	678.736
Fort Gage	St. L. I. M. & S. Ry.	384
Fountain, iron post 200 feet west of R. R crossing	U. S. G. S.	405.975
Fountain Bluff	I. C. R. R.	369
Fountain Creek	C. & E. I. R. R.	677
Fountain Green, chiseled square in concrete walk, northeast corner of street crossing, opposite Woodman's Hall	U. S. G. S.	682.10
Fowler, iron post 1,000 feet east of station and 200 feet north of track	U. S. G. S.	725.294

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Fox	C. B. & Q. Ry.	663
Fox Lake	C. M. & St. P. Ry.	745
Frankfort	E. J. & E. Ry.	764
Franklin	C. B. & Q. Ry.	682
Franklin Grove	C. & N. W. Ry.	810
Franklin Park	C. M. & St. P. Ry.	646
Frederick	C. B. & Q. Ry.	443
Freeburg	I. C. R. R.	515
Freeport	C. M. & St. P. Ry.	760
French Village	L. & N. R. R.	440
Friendsville, tablet on Dr. C. S. Couch's house	U. S. G. S.	481.972
Frontenac	E. J. & E. Ry.	709
Fruit	T. St. L. & W. R. R.	536
Fulton, copper bolt in south foundation of Northern Illinois College	C. and G. S.	597.584
Funkhouser	Van. R. R.	584
Funks Grove	C. & A. Ry.	694
Galatia, tablet on rolling mill	U. S. G. S.	398.149
Gale	I. C. R. R.	343
Galena, iron post in station grounds of C. B. & Q. Ry.	U. S. G. S.	603.191
Galena Junction, tablet on south pier of C. B & Q. Ry. bridge over Galena River	U. S. G. S.	606.212
Galesburg	A. T. & S. F. Ry.	758
Galesville	W. R. R.	722
Galton	I. C. R. R.	655
Galva	C. B. & Q. Ry.	849
Garber	W. R. R.	811
Garden Plain	C. B. & Q. Ry.	707
Garden Prairie	C. & N. W. Ry.	781
Gardner	C. & A. Ry.	590
Gards Point, iron post at Lick Prairie Church	U. S. G. S.	433.728
Garfield	C. & A. Ry.	669
Garrett	C. H. & D. Ry.	675
Gays	C. C. C. & St. L. Ry.	756
Geneseo	C. R. I. & P. Ry.	639
Geneva	C. B. & Q. Ry.	720
Genoa, copper bolt in doorsill of building on Main and Emmett streets	C. and G. S.	838.695
Georgetown	C. C. C. & St. L. Ry.	676
Gerald	C. & E. I. R. R.	734
Gerlaw, top of rail in front of station	U. S. G. S.	735.95
Germantown, tablet on Boniface School	U. S. G. S.	432.236
German Valley	C. G. W. Ry.	811
Gibson	I. C. R. R.	753
Gifford	I. C. R. R.	810
Gilberts	C. & N. W. Ry.	898

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Gilbirds, iron post 350 feet north of schoolhouse	U. S. G. S.	662.068
Gilchrist	C. B. & Q. Ry.	782
Gillespie, square on concrete doorstep of Gillespie National Bank Bldg.	U. S. G. S.	660.35
Gillum, iron post 75 feet west of R. R. station	U. S. G. S.	820.416
Gilman	I. C. R. R.	654
Gilmer	E. J. & E. Ry.	810
Gilson	C. B. & Q. Ry.	687
Girard	C. & A. Ry.	674
Gladstone	C. B. & Q. Ry.	543
Glasford	T. P. & W. Ry.	615
Glenarm	I. C. R. R.	602
Glen Avon	I. C. R. R.	788
Glen Carbon	T. St. L. & W. R. R.	470
Glencoe	C. & N. W. Ry.	673
Glenellyn, tablet on high school building	U. S. G. S.	766.058
Glenview	C. M. & St. P. Ry.	635
Glenwood	C. & E. I. R. R.	628
Godfrey	C. & A. Ry.	611
Golden	C. B. & Q. Ry.	717
Golconda	I. C. R. R.	347
Goodenow	C. & E. I. R. R.	740
Goodfield	L. E. & W. R. R.	744
Goodhope, iron post 100 feet east and 100 feet south of station	U. S. G. S.	714.516
Goodrich	C. I. & S. R. R.	636
Goodwine	C. & E. I. R. R.	660
Gordon	I. C. R. R.	489
Goreville	C. & E. I. R. R.	715
Gorham	St. L. I. M. & S. Ry.	370
Gossett	C. C. C. & St. L. Ry.	416
Grafton, copper bolt in step at entrance to Allen Bldg.	C. and G. S.	446.097
Grand Chain, iron post 180 feet north of station	U. S. G. S.	404.523
Grand Ridge	C. B. & Q. Ry.	652
Grand Tower	I. C. R. R.	370
Granger	I. C. R. R.	785
Granite City, southwest corner of foundation of signal tower opposite Union Station (city B. M.)	U. S. G. S.	425.888
Grant Park	C. & E. I. R. R.	697
Grantsburg	I. C. R. R.	357
Granville, iron post at cross-roads and crossing of C. M. & St. P. Ry., near elevator	U. S. G. S.	688.060
Grape Creek	C. & E. I. R. R.	534

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Grassland, iron post 100 feet east of P. O.	U. S. G. S.	434.306
Graymont	I. C. R. R.	657
Grays Lake	C. M. & St. P. Ry.	799
Greendale, station B. & O. S. W.	C. and G. S.	520
Greenfield	C. & A. Ry.	584
Green Oak	C. B. & Q. Ry.	725
Green River	C. R. I. & P. Ry.	578
Greenup, top of rail at crossing I. C. and Vandalia railroads	U. S. G. S.	553.9
Green Valley	C. & A. Ry.	541
Greenview	C. & A. Ry.	537
Greenville	Van. R. R.	563
Greenwich	C. I. & S. R. R.	630
Gridley	T. P. & W. Ry.	752
Griffith	Van. R. R.	571
Griggsville	W. R. R.	695
Grinnell, iron post in school yard	U. S. G. S.	366.669
Grove	C. & A. Ry.	459
Groveland, tablet on Baptist Church	U. S. G. S.	778.768
Grubbs	I. C. R. R.	392
Gurnee	C. M. & St. P. Ry.	677
Gurney	B. & O. R. R.	597
Guthrie	I. C. R. R.	815
Hadley	W. R. R.	761
Hagaman, crossing C. & A. Ry.	C. P. & St. L. Ry.	517
Hagarstown	Van. R. R.	530
Hagener	C. B. & Q. Ry.	481
Haldane	I. C. R. R.	904
Half Day, tablet on school house	U. S. G. S.	667.628
Hallidayboro, top of rail at crossing just south of station I. C. R. R.	U. S. G. S.	407.4
Hamilton	T. P. & W. Ry.	515
Hammond	C. H. & D. Ry.	677
Hampshire, copper bolt in west wall of P. O.	C. and G. S.	900.349
Hampton, copper bolt in southeast corner of school house	C. and G. S.	580.601
Hanna	Ia. C. R. R.	732
Hanover, iron post at Hanover Hotel	U. S. G. S.	632.215
Hanover Station	C. B. & Q. Ry.	611
Hanson	I. C. R. R.	648
Hardinville, iron post just north of Christian Church	U. S. G. S.	510.903
Harlem	I. C. R. R.	617
Harmon	C. B. & Q. Ry.	674
Harness	C. & A. Ry.	563
Harper	C. M. & St. P. Ry.	939
Harrisburg	C. C. C. & St. L. Ry.	366

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Harrisonville, iron post .5 miles north of crossing of main roads, 400 feet north of cross-roads	Miss. River Com.	398.594
Harristown	W. R. R.	693
Hartsburg	I. C. R. R.	598
Harvel	W. R. R.	639
Harvey	G. T. Ry.	608
Hastings	C. & E. I. R. R.	686
Havana, bolt in east pier of steel highway bridge over Illinois River (U. S. E. C. B. M.)	U. S. G. S.	451.360
Hayes	C. & N. W. Ry.	609
Hazel Dell	C. H. & D. Ry.	612
Hazelhurst	C. B. & Q. Ry.	846
Healey	I. C. R. R.	718
Heman	I. C. R. R.	614
Henderson	C. B. & Q. Ry.	817
Hendrix	I. C. R. R.	795
Henkel	I. C. R. R.	856
Hennepin, iron post in Court House grounds	U. S. G. S.	505.407
Henning	C. & E. I. R. R.	690
Henry	C. R. I. & P. Ry.	491
Henton	C. & E. I. Ry.	623
Herald, iron post at schoolhouse	U. S. G. S.	429.940
Herbert	C. & N. W. Ry.	868
Herborn	W. R. R.	638
Hermon	Ia. C. Ry.	654
Herrick	T. St. L. & W. R. R.	604
Herrin	C. B. & Q. Ry.	405
Hersher	I. C. R. R.	661
Hersman, iron post 120 feet south of station	U. S. G. S.	694.628
Hervey City	Van. R. R.	697
Heyworth	I. C. R. R.	747
Hickman	C. & E. I. R. R.	677
Hickory Grove, Carroll County	C. M. & St. P. Ry.	701
Hidalgo, top of rail in front of station I. C. R. R.	U. S. G. S.	583.1
Highland, tablet on First National Bank	U. S. G. S.	544.680
Highland Park	C. & N. W. Ry.	691
Highwood	C. & N. W. Ry.	684
Hildreth, top of rail in front of station C. H. & D. Ry.	U. S. G. S.	714.3
Hillery	C. C. C. & St. L. Ry.	651
Hillsdale, iron post at C. B. & Q. Ry. station	U. S. G. S.	578.246
Hillview	C. & A. Ry.	446
Hinckley	C. B. & Q. Ry.	740
Hindsboro	Van. R. R.	652

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Hites	C. H. & D. Ry.	704
Hoffman, iron post 200 feet west of railroad station	U. S. G. S.	456.185
Holcomb	C. G. W. Ry.	827
Holder	L. E. & W. R. R.	836
Holland	C. & E. I. R. R.	616
Holliday	B. & O. R. R.	596
Homberg	I. C. R. R.	364
Homewood	I. C. R. R.	659
Honey Bend	W. R. R.	762
Honey Creek	C. B. & Q. Ry.	690
Hoodville	L. & N. R. R.	437
Hookdale	C. B. & Q. Ry.	512
Hoopeston	C. & E. I. R. R.	717
Hopedale	C. & A. Ry.	646
Horace	C. C. C. & St. L. Ry.	650
Hornsby	C. C. C. & St. L. Ry.	666
Horton	C. B. & Q. Ry.	450
Houston, top of rail at road crossing by I. C. R. R.	U. S. G. S.	439.0
Howardton	St. L. I. M. & S. Ry.	365
Hoyleton	I. S. Ry.	523
Hubbard	B. & O. R. R.	490
Hudgens	C. & E. I. R. R.	494
Hudson	I. C. R. R.	768
Huey, iron post at crossing of railroad and road near railroad station	U. S. G. S.	453.861
Hughes	C. H. & D. Ry.	658
Hulls	C. B. & Q. Ry.	448
Humboldt	I. C. R. R.	664
Hume	C. H. & D. Ry.	651
Humrick	T. St. L. & W. R. R.	651
Hunt City	C. H. & D. Ry.	529
Huntley	C. & N. W. Ry.	888
Hutsonville, center of chiseled square on step of public school building	C. and G. S.	451.489
Illinoi	C. I. & S. R. R.	631
Illiopolis	W. R. R.	607
Ina	C. & E. I. R. R.	432
Indianola	C. & E. I. R. R.	672
Iola	B. & O. R. R.	514
Iowa Junction, Henderson County	C. B. & Q. Ry.	552
Irene	I. C. R. R.	821
Iron, iron post at northeast corner of junction, 5 feet west of southwest corner of warehouse	U. S. G. S.	462.896
Irving	C. C. C. & St. L. Ry.	652

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Irwin	I. C. R. R.	665
Itasca	C. M. & St. P. Ry.	694
Iuka, station B. & O. R. R.	C. and G. S.	518
Ivesdale	W. R. R.	683
Jacksonville	C. & A. Ry.	607
Jamaica, iron post 145 feet northwest of railroad station	U. S. G. S.	677.913
Jamesburg	C. & E. I. R. R.	685
Janesville	I. C. R. R.	693
Jerseyville	C. & A. Ry.	654
Jewett	Van. R. R.	587
Johnston City	C. & E. I. R. R.	423
Joliet, bolt in south wall of Court House	Engineer Corps	545.184
Jonesboro	M. & O. R. R.	523
Joppa	C. & E. I. R. R.	335
Joppa Junction	C. & E. I. R. R.	342
Joslyn, iron post in W. H. Whiteside's yard	U. S. G. S.	582.343
Joy	C. B. & Q. Ry.	682
Kane	C. & A. Ry.	566
Kangley	C. B. & Q. Ry.	638
Kankakee	I. C. R. R.	631
Kansas	C. C. C. & St. L. Ry.	713
Kappa	I. C. R. R.	739
Karnak, iron post in grove 115 feet south of depot	U. S. G. S.	339.881
Kasbeer	C. B. & Q. Ry.	746
Kaskaskia	L. & N. R. R.	409
Kaufman	T. St. L. & W. R. R.	543
Keene	So. Ry.	444
Keensburg, tablet on Methodist Episcopal Church	U. S. G. S.	430.072
Keithsburg, copper bolt in step at entrance to furniture store, Main and 2d streets	C. and G. S.	539.899
Kell	C. & E. I. R. R.	610
Keller	C. R. I. & P. Ry.	801
Kemp	Van. R. R.	645
Kemper	C. B. & Q. Ry.	556
Kempton	I. C. R. R.	733
Kenner, station B. & O. R. R.	C. and G. S.	505
Kenney	I. C. R. R.	652
Kent	C. G. W. Ry.	897
Kernan	A. T. & S. F. Ry.	671
Kerrick	I. C. R. R.	853
Kewanee	C. B. & Q. Ry.	853
Kilbourne, tablet on McFadden's elevator	U. S. G. S.	495.565
Kinderhook	W. R. R.	471
Kingman	T. St. L. & W. R. R.	632

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Kings, Ogle County	C. B. & Q. Ry.	890
Kings, Perry County	I. C. R. R.	536
Kingston	C. M. & St. P. Ry.	793
Kingston Mines, copper bolt in water table of J. Chapman's store	C. and G. S.	804.981
Kinmundy	C. & E. I. R. R.	595
Kirkland, copper bolt in foundation of Dean & Rowen's bank	C. and G. S.	774.820
Kirksville	C. & E. I. R. R.	676
Kirkwood	C. B. & Q. Ry.	742
Kishwaukee	W. B. R. R.	730
Kittredge	C. M. & St. P. Ry.	855
Knox	A. T. & S. F. Ry.	680
Knoxville	C. B. & Q. Ry.	777
Koster	C. & E. I. R. R.	634
Kumler	I. C. R. R.	737
Laclede	I. C. R. R.	569
Lacrosse	T. P. & W. Ry.	645
Ladd	C. B. & Q. Ry.	653
Lafayette	C. R. I. & P. Ry.	797
La Fox	C. & N. W. Ry.	803
Lagrange	C. B. & Q. Ry.	645
LaHarpe, iron post 0.1 mile west of station on north side of railroad at intersection of street and railroad property line	U. S. G. S.	691.414
La Hogue	T. P. & W. Ry.	664
Lake Bluff	C. & N. W. Ry.	683
Lake City	Van. R. R.	691
Lake Forest, iron post at southeast corner City Hall grounds	U. S. G. S.	912.913
Lake Fork	I. C. R. R.	607
Lake Villa	W. C. Ry.	796
Lakewood	B. & O. R. R.	621
Lake Zurich	E. J. & E. Ry.	873
Lamoille	C. B. & Q. Ry.	803
Lancaster, tablet on Lutheran Church	U. S. G. S.	494.784
Lane	I. C. R. R.	726
Lanesville	W. R. R.	598
Lansing	P. C. C. & St. L. Ry.	618
Laplace	C. H. & D. Ry.	712
La Prairie	C. B. & Q. Ry.	707
Larchland, iron post 450 feet north of station	U. S. G. S.	734.421
La Rose	A. T. & S. F. Ry.	643
Larue	St. L. I. M. & S. Ry.	364
La Salle, square on top of south wall of Lock No. 15	Engineer Corps	448.400
Latham	I. C. R. R.	616

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Latham Park	C. M. & St. P. Ry.	725
Laura	A. T. & S. F. Ry.	732
Laurette	I. C. R. R.	766
Lawndale, iron post near railroad station	U. S. G. S.	596.489
Lawrenceville, iron post in Court House yard	U. S. G. S.	472.217
Leaf River, copper bolt in foundation of D. Sprecher's elevator	C. and G. S.	709.146
Leaman	T. P. & W. Ry.	508
Lebanon, B. M. on basement windowsill of school house	C. and G. S.	457.491
Ledford	C. C. C. & St. L. Ry.	403
Lee	C. B. & Q. Ry.	939
Leeds	A. T. & S. F. Ry.	677
Leithton	E. J. & E. Ry.	723
Leland	C. B. & Q. Ry.	705
Lemont, bolt in water table on northwest side of Dutton's store	Engineer Corps	605.425
Lena	I. C. R. R.	964
Leonore	C. B. & Q. Ry.	681
Leo Rock	I. C. R. R.	369
Lerna, iron post at I. C. R. R. station	U. S. G. S.	754.316
Leroy, iron post 300 feet east of station	U. S. G. S.	779.903
Leverett	I. C. R. R.	732
Levings	C. C. C. & St. L. Ry.	454
Lewistown, tablet on Court House	U. S. G. S.	596.145
Lexington	C. & A. Ry.	746
Lily Lake	C. G. W. Ry.	922
Lincoln, tablet on concrete post at southwest entrance to Court House	U. S. G. S.	590.856
Lindenwood	C. G. W. Ry.	769
Lintner	C. H. & D. Ry.	688
Little York	Ia. C. Ry.	601
Livingston	C. & E. I. R. R.	586
Lockport, cross on west wall of Lock No. 1	Engineer Corps	581.562
Loda	I. C. R. R.	780
Lodemia	W. R. R.	658
Lodge	I. C. R. R.	700
Lomax	A. T. & S. F. Ry.	552
Lombardville	C. B. & Q. Ry.	755
London Mills, bolt in corner of C. B. & Q. Ry. station	U. S. G. S.	534.70
Long Creek	C. H. & D. Ry.	677
Long Point	A. T. & S. F. Ry.	641
Longview	C. & E. I. R. R.	674
Loogootee	C. & E. I. R. R.	604
Loon Lake	W. C. Ry.	783
Loraine	C. B. & Q. Ry.	644

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Lorenzo	A. T. & S. F. Ry.	536
Lostant	I. C. R. R.	702
Lotus	I. C. R. R.	753
Lovington	Van. R. R.	683
Lowder	C. B. & Q. Ry.	695
Low Point	C. & A. Ry.	717
Loxa	C. C. C. & St. L. Ry.	672
Ludlow	I. C. R. R.	773
Lyndon	C. B. & Q. Ry.	623
Lynn, top of rail in front of station	U. S. G. S.	733.24
McCall	T. P. & W. Ry.	699
McClure	I. C. R. R.	347
McConnell	I. C. R. R.	773
McDowell	W. R. R.	652
McKeen	Van. R. R.	585
Mackinaw, tablet on C. C. C. & St. L. Ry. water tank	U. S. G. S.	646.239
McKinley, iron post near railroad station	U. S. G. S.	554.640
McLean	C. & A. Ry.	708
McLeansboro	L. & N. R. R.	500
McNabb	C. I. & S. R. R.	680
McNulta	I. C. R. R.	755
Macomb	C. B. & Q. Ry.	702
Macon	I. C. R. R.	721
Macoupin, iron post 200 feet southwest of station	U. S. G. S.	532.686
Madison	I. C. R. R.	418
Magnet	I. C. R. R.	748
Mahomet, iron post 230 feet west of railroad station	U. S. G. S.	712.117
Makanda, B. M. on capstone of south abutment of Drury Creek bridge one mile north of town	C. and G. S.	431.393
Malden	C. B. & Q. Ry.	705
Malta	C. & N. W. Ry.	915
Manchester	C. & A. Ry.	691
Manhattan	W. R. R.	681
Mansfield, top of rail in front of station C. C. C. & St. L. Ry.	U. S. G. S.	729.7
Manteno	I. C. R. R.	694
Manville	W. R. R.	617
Maple Park	C. & N. W. Ry.	863
Mapleton	T. P. & W. Ry.	467
Maquon	C. B. & Q. Ry.	630
Marblehead	C. B. & Q. Ry.	458
Marengo	C. & N. W. Ry.	819
Marietta	T. P. & W. Ry.	546

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Marigold, iron post in school yard	U. S. G. S.	564.680
Marine	I. C. R. R.	526
Marinton	C. & E. I. R. R.	627
Marion	I. C. R. R.	435
Marissa, iron post in school yard	U. S. G. S.	448.378
Markham	W. R. R.	593
Marley, Will County	W. R. R.	666
Maroa	Van. R. R.	720
Marseilles, circle on south wall of Lock No. 9	Engineer Corps	505.553
Marshall	Van. R. R.	618
Martinsville	Van. R. R.	562
Maryland	C. B. & Q. Ry.	881
Mascoutah	L. & N. R. R.	425
Mason City	C. & A. Ry.	581
Matthews	I. C. R. R.	392
Mattoon, tablet on concrete post at crossing of I. C. R. R. and Twenty-first Street	U. S. G. S.	725.03
Maunie, tablet on Methodist Church	U. S. G. S.	375.171
Maxwell	Ia. C. Ry.	694
Mays, top of rail in front of station Vandalia R. R.	U. S. G. S.	689.6
Maysville	W. R. R.	744
Mayview, top of rail in front of station C. C. C. & St. L. Ry.	U. S. G. S.	686.0
Maywood	C.&N.W.; C.G.W. Rys	628
Mazon	A. T. & S. F. Ry.	592
Mazonia	C. & A. Ry.	580
Meacham	C. M. & St. P. Ry.	739
Meadows	T. P. & W. Ry.	758
Media	A. T. & S. F. Ry.	715
Medora	C. B. & Q. Ry.	622
Melwood	T. St. L. & W. R. R.	669
Menard	I. S. Ry.	377
Mendon	C. B. & Q. Ry.	654
Meredosia, top of rail in front of station	U. S. G. S.	448.09
Meriden	C. B. & Q. Ry.	733
Merna	I. C. R. R.	812
Merriam	So. Ry.	406
Merritt	C. B. & Q. Ry.	608
Metcalf	T. St. L. & W. R. R.	664
Metropolis	I. C. R. R.	339
Middle Grove, top of rail at road crossing west of station	U. S. G. S.	726.1
Middlesworth	C. C. C. & St. L. Ry.	699
Middletown	C. & A. Ry.	586
Midland City	Van. R. R.	654
Milan	C. R. I. & P. Ry.	570

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Miles	C. & A. Ry.	673
Milford	C. & E. I. R. R.	666
Milla	C. I. & S. R. R.	670
Millbrig	C. & N. W. Ry.	625
Millbrook	C. B. & Q. Ry.	620
Mill Creek	M. & O. R. R.	376
Milledgeville	C. B. & Q. Ry.	759
Millersville	B. & O. R. R.	640
Millington	C. B. & Q. Ry.	565
Millsdale	C. & A. Ry.	525
Mill Shoals	B. & O. R. R.	384
Millstadt, iron post on southeast corner of school house in northwest part of town	U. S. G. S.	614.544
Milmine	W. R. R.	713
Milroy	C. B. & Q. Ry.	558
Mineral	C. R. I. & P. Ry.	636
Minier, crossing C. & A. Ry.	Van. R. R.	637
Minonk	A. T. & S. F. Ry.	751
Minonk Junction	I. C. R. R.	740
Minooka	E. J. & E. Ry.	632
Missal	C. I. & S. R. R.	668
Mitchell	C. & E. I. R. R.	430
Moccasin	C. & E. I. R. R.	612
Mode	C. & E. I. R. R.	623
Mokena	C. R. I. & P. Ry.	719
Moline	C. B. & Q. Ry.	575
Momence	C. & E. I. R. R.	632
Monee	I. C. R. R.	803
Monmouth, iron post at corner of 3d St. and E. 2d Ave.	U. S. G. S.	762.731
Monroe Center, center of copper bolt in wall of elevator building 79 feet west of station	C. and G. S.	842.986
Mont	I. C. R. R.	570
Montgomery, Kane County	C. B. & Q. Ry.	645
Monticello	I. C. R. R.	659
Montrose	Van. R. R.	601
Moore, Union County	I. C. R. R.	453
Moro, Madison County	C. C. C. & St. L. Ry.	529
Morris, B. M. on east wing wall of north abutment of highway bridge over Illinois River	Engineer Corps	504.063
Morrison	C. & N. W. Ry.	670
Morrisonville	W. R. R.	635
Mortimer	T. St. L. & W. R. R.	703
Morton Grove	C. M. & St. P. Ry.	628
Mound City	C. C. C. & St. L. Ry.	321
Mounds	I. C. R. R.	323

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Mountain Glen	M. & O. R. R.	449
Mount Auburn	C. H. & D. Ry.	605
Mount Carmel, tablet on Court House	U. S. G. S.	465.241
Mount Carroll, copper bolt in foundation of barn connected with elevator	C. and G. S.	817.159
Mount Morris	C. B. & Q. Ry.	898
Mount Olive, iron post in southeast corner of school yard	U. S. G. S.	681.044
Mount Prospect	C. & N. W. Ry.	672
Mount Pulaski	I. C. R. R.	637
Mount Sterling, iron post in northeast corner of highway and railway crossing 0.5 miles west of station	U. S. G. S.	710.849
Mount Vernon	C. & E. I. R. R.	463
Mount Zion	Van. R. R.	684
Moweaqua	I. C. R. R.	629
Mulberry Grove	Van. R. R.	559
Mulkeytown, tablet on Hall of Modern Woodmen of America	U. S. G. S.	449.017
Muncie	C. C. C. & St. L. Ry.	658
Munster	C. & A. Ry.	644
Murdock	C. H. & D. Ry.	647
Murphysboro, iron post in Court House lot	U. S. G. S.	419.542
Murrayville	C. & A. Ry.	686
Myrtle	C. G. W. Ry.	766
Nachusa	C. & N. W. Ry.	790
Nameoki	C. & E. I. R. R.	425
Naperville, tablet on Nicholas Library	U. S. G. S.	693.310
Naples	W. R. R.	448
Narita	I. C. R. R.	614
Nashville	I. S. Ry.	505
Natrona	C. & A. Ry.	576
Nebo	C. & A. Ry.	490
Neeleys	W. R. R.	665
Nekoma	C. B. & Q. Ry.	817
Nelson	C. & N. W. Ry.	656
Nemo	Ia. C. Ry.	777
Neoga	T. St. L. & W. R. R.	659
Neponset	C. B. & Q. Ry.	829
Nevada	C. & A. Ry.	680
Nevins	Van. R. R.	687
New Athens, iron post in school yard	U. S. G. S.	429.865
New Baden, tablet on bank	U. S. G. S.	462.069
New Boston, copper bolt in north wall of Union Hotel	C. and G. S.	570.700
New Burnside	C. C. C. & St. L. Ry.	560
New Canton	C. B. & Q. Ry.	449

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
New Design, iron post at southwest corner of T road west at south edge of town	U. S. G. S.	661.361
New Douglas	T. St. L. & W. R. R.	610
Newell	W. R. R.	671
New Hanover	M. & O. R. R.	588
New Haven, tablet on Scudmore and Mathia Bank	U. S. G. S.	370.271
New Holland	C. & A. Ry.	545
New Lebanon	C. M. & St. P. Ry.	848
New Lenox	C. R. I. & P. Ry.	630
Newman	C. H. & D. Ry.	651
New Milford	C. B. & Q. Ry.	720
New Philadelphia	T. P. & W. Ry.	671
New Salem	W. R. R.	788
Newton, iron post 180 feet northwest of railroad station	U. S. G. S.	512.989
New Windsor	C. B. & Q. Ry.	808
Niantic	W. R. R.	603
Nilwood	C. & A. Ry.	670
Noble, station B. & O. R. R.	C. and G. S.	477
Nokomis	C. & E. I. R. R.	668
Nolting	I. S. Ry.	462
Normal	C. & A. Ry.	790
Normantown	E. J. & E. Ry.	670
Norris, Fulton County	C. B. & Q. Ry.	732
Norris City, tablet on Cumberland Presbyterian Church	U. S. G. S.	443.676
North Aurora	C. & N. W. Ry.	651
North Chicago	E. J. & E. Ry.	673
North Henderson, iron post 500 feet west of station	U. S. G. S.	775.35
Novak	A. T. & S. F. Ry.	604
Oakdale, Washington County, top of rail in front of station I. C. R. R.	U. S. G. S.	523.2
Oakford, tablet on H. Luke and Son's store building	U. S. G. S.	495.159
Oakland, tablet on J. T. Simm's grain elevator	U. S. G. S.	658.718
Oaklawn	C. & E. I. R. R.	640
Oakley	W. R. R.	691
Oak Park	C. & N. W. Ry.	630
Oakwood	C. C. C. & St. L. Ry.	648
Oblong, geodetic station	U. S. L. S.	500
Oconee	I. C. R. R.	679
Odell	C. & A. Ry.	721
Odin, iron post 125 feet south of I. C. R. R. and B. & O. R. R.	U. S. G. S.	526.785

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
O'Fallon, iron post at southwest corner of brick platform at B. & O. R. R. station	U. S. G. S.	550.520
Ogden	C. C. C. & St. L. Ry.	675
Ogle	I. C. R. R.	575
Oglesby	C. B. & Q. Ry.	465
Ohio	C. B. & Q. Ry.	917
Ohlman	C. & E. I. R. R.	683
Oilfield	C. H. & D. Ry.	662
Olive Branch	C. & E. I. R. R.	340
Oliver	C. C. C. & St. L. Ry.	633
Olmstead	C. C. C. & St. L. Ry.	355
Olney, tablet at entrance to Court House	U. S. G. S.	483.645
Omaha, iron post 90 feet south of railroad station	U. S. G. S.	366.921
Oneida	C. B. & Q. Ry.	814
Ontarioville	C. M. & St. P. Ry.	815
Opdyke	L. & N. R. R.	509
Ophiem, iron post 300 feet south and 300 feet east of station	U. S. G. S.	699.105
Oquawka, copper bolt in northwest corner of building on Third and Schuyler streets	C. and G. S.	548.132
Orangeville	I. C. R. R.	797
Oraville, iron post near railroad station	U. S. G. S.	395.944
Oreana	I. C. R. R.	694
Oregon	C. B. & Q. Ry.	700
Orion, top of rail in front of station	U. S. G. S.	749.68
Orland	W. R. R.	698
Orleans	W. R. R.	658
Ormonde	A. T. & S. F. Ry.	778
Osbernville	C. H. & D. Ry.	603
Osborn	C. B. & Q. Ry.	588
Osco	C. R. I. & P. Ry.	779
Oswego	C. B. & Q. Ry.	615
Ottawa, tablet on La Salle County Court House	U. S. G. S.	485.730
Otto	I. C. R. R.	632
Owaneco	B. & O. R. R.	627
Ozark	I. C. R. R.	668
Padua	L. E. & W. R. R.	837
Palatine	C. & N. W. Ry.	751
Palermo, geodetic station	U. S. L. S.	742
Palestine	I. C. R. R.	454
Palmer	W. R. R.	625
Paloma, top of rail in front of station	U. S. G. S.	739.17
Pana	C. & E. I. R. R.	696
Panama	T. St. L. & W. R. R.	526
Panola	I. C. R. R.	735

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Papineau	C. & E. I. R. R.	630
Paris, tablet on Vandalia freight station	U. S. G. S.	739.271
Parker	I. C. R. R.	500
Parkersburg, geodetic station	U. S. L. S.	568
Park Ridge	C. & N. W. Ry.	658
Parnell	I. C. R. R.	740
Parrish, iron post at Brown and Moore's store	U. S. G. S.	439.476
Patoka	I. C. R. R.	507
Patterson	A. T. & S. F. Ry.	515
Patton, iron post at J. W. Elliott's house	U. S. G. S.	416.893
Pawnee Junction	I. C. R. R.	612
Pawpaw	C. B. & Q. Ry.	928
Paxton	I. C. R. R.	794
Payne	C. H. & D. Ry.	674
Pearl	C. & A. Ry.	451
Pearl City	C. G. W. Ry.	823
Pecatonica	C. & N. W. Ry.	754
Pekin, iron bolt in water table of County Clerk's office (City B. M.)	U. S. G. S.	479.092
Penfield	I. C. R. R.	725
Peoria, tablet on Bradley Polytechnic Institute	U. S. G. S.	607.599
Peotone	I. C. R. R.	722
Percy	M. & O. R. R.	467
Perdueville	L. E. & W. R. R.	764
Perks	C. & E. I. R. R.	343
Perry Springs, top of rail in front of station	U. S. G. S.	441.43
Perryville	I. C. R. R.	767
Peru, bolt in pier at north end of draw span of highway bridge over Illinois River at foot of Marion Street	Engineer Corps	458.954
Pesotum	I. C. R. R.	720
Peters	T. St. L. & W. R. R.	449
Petersburg, tablet on Court House	U. S. G. S.	523.706
Petra	C. R. I. & P. Ry.	672
Phelps	Ia. C. Ry.	776
Philadelphia	B. & O. R. R.	594
Philo, tablet on Philo Exchange Bank	U. S. G. S.	736.833
Piasa	C. B. & Q. Ry.	614
Pierron	Van. R. R.	524
Pike	C. B. & Q. Ry.	436
Pinckneyville	I. C. R. R.	446
Pingree Grove, copper bolt in foundation of J. B. Schedden's building	C. and G. S.	917.833
Pinkstaff	C. C. C. & St. L. Ry.	433
Piper City	T. P. & W. Ry.	673
Pisgah	C. B. & Q. Ry.	671
Pittwood	C. & E. I. R. R.	643

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Plainfield	E. J. & E. Ry.	612
Plainview	C. & A. Ry.	625
Plano	C. B. & Q. Ry.	649
Plato Center	I. C. R. R.	914
Pleasant Hill	C. & A. Ry.	463
Pleasant Plains, tablet on State Bank	U. S. G. S.	615.350
Plymouth, iron post northeast corner Central Park	U. S. G. S.	655.776
Pocahontas	Van. R. R.	500
Poland	W. C. & W. R. R.	394
Polo	C. B. & Q. Ry.	836
Pomona	M. & O. R. R.	403
Pontiac	C. & A. Ry.	647
Poplar City	I. C. R. R.	509
Port Byron, copper bolt in west foundation of N. Dorrance's building	C. and G. S.	581.859
Potomac	I. C. R. R.	684
Pottstown	C. B. & Q. Ry	486
Prairie City, iron post SW. cor NW. ¼ sec. 1, at northwest corner crossroads	U. S. G. S.	667.757
Prairie du Rocher, iron post in apple orchard at south end of town	U. S. G. S.	395.764
Prairie Hall	Van. R. R.	707
Prairie View	W. C. Ry.	694
Preemption	C. R. I. & P. Ry.	814
Prentice	C. & A. Ry.	630
Princeton, iron post in Court House yard	U. S. G. S.	718.767
Princeville	A. T. & S. F. Ry.	745
Priscilla	C. I. & S. R. R.	655
Prophetstown	C. B. & Q. Ry.	627
Prouty	C. & A. Ry.	662
Pulaski	I. C. R. R.	340
Putnam, pipe in southeast corner of yard of First Methodist Episcopal Church	Engineer Corps	526.786
Quincy, aluminum tablet in base of rectangular column at southwest corner of Adams County Court House	U. S. G. S.	601.514
Quincy Junction	C. & A. Ry.	463
Raddle	St. L. I. M. & S. Ry.	373
Radford	I. C. R. R.	629
Radley	C. B. & Q. Ry.	745
Radom, B. M. on north abutment of bridge over Little Muddy Creek	C. and G. S.	499.811
Ramsey	T. St. L. & W. R. R.	612
Randolph	I. C. R. R.	781
Rankin	L. E. & W. R. R.	718
Ransom	A. T. & S. F. Ry.	705

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Rantoul	I. C. R. R.	758
Rapatee	Ia. C. Ry.	685
Rapids City, copper bolt in foundation of H. M. Gilchrist's building	C. and G. S.	576.741
Rardin, top of rail in front of station T. St. L. & W. R. R.	U. S. G. S.	664.9
Raven	C. H. & D. Ry.	628
Ravinia	C. & N. W. Ry.	677
Ray	C. B. & Q. Ry.	517
Raymond	W. R. R.	643
Rayville	I. C. R. R.	695
Reader	C. & A. Ry.	586
Redbud, iron post at railroad crossing near station	U. S. G. S.	444.241
Reddick	C. I. & S. R. R.	610
Redmon, tablet on Redmon Bank	U. S. G. S.	690.322
Red Oak	I. C. R. R.	773
Reevesville, iron post in southeast corner of yard of M. E. Church	U. S. G. S.	351.021
Reilly	C. & E. I. R. R.	747
Renault, iron post in northwest corner of public square	U. S. G. S.	684.448
Renault Station	C. St. L. M. & S. R. R.	392
Reno	C. B. & Q. Ry.	578
Reynolds	C. R. I. & P. Ry.	813
Reynoldsville	I. C. R. R.	349
Richards	C. B. & Q. Ry.	645
Richardson	C. G. W. Ry.	882
Richland, tablet on gasoline storage house of the Farmers' Elevator Co.	U. S. G. S.	611.752
Richton	I. C. R. R.	731
Richview, cut on capstone at east end of railroad culvert, 1 mile north of Richview	C. and G. S.	544.196
Ridenhower	C. C. C. & St. L. Ry.	359
Ridge Farm	T. St. L. & W. R. R.	694
Ridgely	C. & A. Ry.	597
Ridgeville	I. C. R. R.	676
Ridgway, tablet on Catholic Church	U. S. G. S.	376.920
Ridott	C. & N. W. Ry.	750
Riggston	C. B. & Q. Ry.	606
Rileyville, top of rail in front of station I. C. R. R.	U. S. G. S.	398.9
Rinard	B. & O. R. R.	461
Rio, 400 feet north of P. O.	C. B. & Q. Ry.	784
Riola	C. & E. I. R. R.	685
Risk	I. C. R. R.	747
Ritchie	W. R. R.	563

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Riverton, tablet on doorsill at entrance to opera house	U. S. G. S.	552.796
Riverview	W. C. Ry.	643
Roaches	L. & N. R. R.	498
Roanoke	A. T. & S. F. Ry.	722
Roberts	I. C. R. R.	786
Robinson, tablet on wall on south side of Court House	U. S. G. S.	534.529
Rochelle	C. B. & Q. Ry.	793
Rochester	B. & O. R. R.	578
Rockbridge	C. B. & Q. Ry.	556
Rock City	C. M. & St. P. Ry.	900
Rockford	C. M. & St. P. Ry.	714
Rock Island, tablet on First Baptist Church	U. S. G. S.	566.413
Rock Island Junction	B. & O. R. R.	589
Rockport	C. B. & Q. Ry.	452
Rockton	C. M. & St. P. Ry.	748
Rockwood	St. L. I. M. & S. Ry.	376
Rodden	C. G. W. Ry.	690
Roland	B. & O. R. R.	430
Rollo	C. & N. W. Ry.	754
Rondout	C. M. & St. P. Ry.	678
Roodhouse	C. & A. Ry.	650
Roots	I. S. Ry.	387
Rosamond	C. & E. I. R. R.	711
Roscoe	C. M. & St. P. Ry.	740
Rosehill, Jasper County, top of rail in front of station I. C. R. R.	U. S. G. S.	567.4
Roselle, copper bolt in foundation of Mathew Secker's brick business building (U. S. E. C. P. B. M. 90)	C. and G. S.	772.155
Roseville, iron post 750 feet north of station	U. S. G. S.	732.365
Rossville	C. & E. I. R. R.	700
Rossville Junction	C. & E. I. R. R.	668
Round Grove	C. & N. W. Ry.	686
Round Knob	I. C. R. R.	356
Rowe	W. R. R.	642
Rowell	Van. R. R.	765
Royal	C. & E. I. R. R.	682
Ruma, iron post at southeast corner of cross-roads	U. S. G. S.	442.899
Rush, iron post at crossroads	U. S. G. S.	995.731
Rushville	C. B. & Q. Ry.	683
Russell	C. M. & St. P. Ry.	677
Rutland	I. C. R. R.	710
Ryder	W. C. & W. R. R.	427
Sacramento	B. & O. R. R.	413

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Sadorus	W. R. R.	692
Saint Anne	C. & E. I. R. R.	657
Saint Augustine	C. B. & Q. Ry.	650
Saint Charles, tablet on school house in Home for Boys	U. S. G. S.	801.819
Saint Elmo	Van. R. R.	618
Saint Francisville, iron post 2,000 feet south of station near intersection of railroad and road west from city	U. S. G. S.	440.446
Saint Jacob	Van. R. R.	508
Saint James	C. & E. I. R. R.	600
Saint Johns	I. C. R. R.	466
Saint Joseph	C. C. C. & St. L. Ry.	673
Sainte Marie, iron post in yard of F. L. Britton, 300 feet south of station	U. S. G. S.	482.344
Saint Peter	C. & E. I. R. R.	595
Saint Rose, tablet on Catholic Church	U. S. G. S.	503.977
Salem, B. M. southeast of Court House	C. and G. S.	544.327
Salisbury, tablet on school house	U. S. G. S.	591.575
Saluda	C. B. & Q. Ry.	769
Sandoval	B. & O. R. R.	509
Sand Prairie	I. C. R. R.	495
Sand Ridge, Grundy County	C. R. I. & P. Ry.	545
Sand Ridge, Jackson County	I. C. R. R.	372
Sandwich	C. B. & Q. Ry.	667
Sangamon	W. R. R.	691
San Jose	C. & A. Ry.	598
Saunemin	W. R. R.	686
Savanna, copper bolt in doorsill of engine room, C. M. & St. P. Ry. elevator	C. and G. S.	592.312
Savoy	I. C. R. R.	740
Saxony	I. C. R. R.	699
Scales Mound, iron post in school yard	U. S. G. S.	955.640
Schapville, tablet on Zion Presbyterian Church	U. S. G. S.	859.030
Scheller	W. C. & W. R. R.	518
Sciota, top of rail in front of station	U. S. G. S.	757.2
Scotland	C. H. & D. Ry.	635
Scottsburg, top of rail in front of station	U. S. G. S.	670.9
Scovel	I. C. R. R.	694
Sears	C. R. I. & P. Ry.	581
Seaton	Ia. C. Ry.	615
Secor	T. P. & W.	739
Seigert	I. C. R. R.	438
Seneca	C. R. I. & P. Ry.	521
Sepo	C. B. & Q. Ry.	457
Serena, top of west rail in front of station	U. S. G. S.	632.8
Sesser	C. B. & Q. Ry.	475

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Seville	T. P. & W. Ry.	496
Seward	I. C. R. R.	764
Seymour, iron post 100 feet west of railroad station	U. S. G. S.	697.650
Shabbona	C. B. & Q. Ry.	900
Shabbona Grove	C. & N. W. Ry.	816
Shannon	C. M. & St. P. Ry.	919
Sharon, iron post at Wm. Ornett's stock farm	U. S. G. S.	628.228
Sharps	B. & O. R. R.	592
Shattuc, iron post 600 feet west of station	U. S. G. S.	463.234
Shawneetown, iron post at L. & N. R. R. station	U. S. G. S.	349.534
Shaws	C. B. & Q. Ry.	804
Sheffield	C. R. I. & P. Ry.	671
Shelbyville, tablet on Court House	U. S. G. S.	650.23
Sheldon	C. C. C. & St. L. Ry.	688
Shepherd	W. R. R.	470
Sheridan	C. B. & Q. Ry.	590
Sheridan Junction	C. B. & Q. Ry.	640
Sherman	C. & A. Ry.	582
Sherrard	C. R. I. & P. Ry.	812
Shinn	C. B. & Q. Ry.	448
Shipman	C. & A. Ry.	636
Shirland	C. M. & St. P. Ry.	735
Shirley	C. & A. Ry.	762
Shobonier	I. C. R. R.	519
Shumway	W. R. R.	657
Sibley	W. R. R.	808
Sidell, tablet on High School building	U. S. G. S.	685.184
Sidney, tablet on High School building	U. S. G. S.	672.575
Sigel	I. C. R. R.	630
Sinclair	C. & A. Ry.	625
Skelton, iron post at crossing of road and I. C. R. R.	U. S. G. S.	611.482
Smithboro	Van. R. R.	551
Smithdale	C. & A. Ry.	624
Smithfield, iron post 50 feet west of railroad station	U. S. G. S.	650.304
Smithshire	A. T. & S. F. Ry.	741
Sollitt	C. & E. I. R. R.	710
Solon Mills	C. M. & St. P. Ry.	792
Somonauk	C. B. & Q. Ry.	690
Sorento	T. St. L. & W. R. R.	587
South Elgin, curb in front of hotel	U. S. G. S.	710.3
South Wilmington	E. J. & E. Ry.	590
Sparland	C. R. I. & P. Ry.	464
Sparta	M. & O. R. R.	534

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Spaulding, Cook County	C. M. & St. P. Ry.	772
Spillertown	C. & E. I. R. R.	514
Spires	I. C. R. R.	736
Springer	B. & O. R. R.	385
Springfield, copper bolt in stone post at southwest entrance of Court House grounds (City B. M.)	U. S. G. S.	598.319
Spring Grove	C. M. & St. P. Ry.	781
Spring Valley, B. M. on coping of C. R. I. & P. Ry. bridge over Spring Creek	Engineer Corps	464.943
Springville	M. & O. R. R.	399
Staley, top of rail in front of station I. C. R. R.	U. S. G. S.	740.6
Stallings	T. St. L. & W. R. R.	424
Stanford	C. & A. Ry.	679
Stark	C. R. I. & P. Ry.	664
Staunton, iron post at southeast corner of park	U. S. G. S.	621.964
Steeleville	W. C. & W. R. R.	438
Sterling	C. & N. W. Ry.	645
Steward	C. B. & Q. Ry.	825
Stewardson	T. St. L. & W. R. R.	647
Stillman Valley, copper bolt in foundation of White's elevator	C. and G. S.	706.892
Stillwell	C. B. & Q. Ry.	669
Stockdale	C. R. I. & P. Ry.	522
Stockland	C. & E. I. R. R.	695
Stockton	C. G. W. Ry.	1000
Stokes, iron post in yard of J. Pyle's store	U. S. G. S.	414.623
Stonefort	C. C. C. & St. L. Ry.	410
Stonington	W. R. R.	613
Stoy	I. C. R. R.	471
Strasburg	W. R. R.	641
Stratford	C. B. & Q. Ry.	816
Straut	C. & A. Ry.	651
Strawn	W. R. R.	768
Streator	A. T. & S. F. Ry.	625
Stronghurst	A. T. & S. F. Ry.	675
Stubblefield	Van. R. R.	527
Sublette	I. C. R. R.	920
Suffern	Van. R. R.	654
Sugar Creek, iron post at Peter Schroot's store	U. S. G. S.	458.466
Sugar Grove	C. B. & Q. Ry.	729
Sullivan	C. & E. I. R. R.	686
Summerfield, tablet on school house	U. S. G. S.	478.074
Sumner, tablet on Hart Wagner's brick building	U. S. G. S.	462.148
Sunbury	C. I. & S. R. R.	660
Sunfield	I. C. R. R.	469

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Surrey	A. T. & S. F. Ry.	766
Sutton	E. J. & E. Ry.	832
Swan Creek	C. B. & Q. Ry.	766
Swift	I. C. R. R.	727
Swygert	I. C. R. R.	737
Sycamore	C. G. W. Ry.	840
Symerton	W. R. R.	638
Table Grove	C. B. & Q. Ry.	694
Tabor	Van. R. R.	668
Tallula	C. & A. Ry.	625
Tamalco	C. B. & Q. Ry.	480
Tamaroa	I. C. R. R.	510
Tamms	C. & E. I. R. R.	340
Tampico	C. B. & Q. Ry.	647
Taylor Ridge	C. R. I. & P. Ry.	793
Taylorville	B. & O. R. R.	609
Tazewell	Van. R. R.	660
Teheran	I. C. R. R.	541
Tennessee	C. B. & Q. Ry.	687
Teutopolis	Van. R. R.	603
Texas City	C. C. C. & St. L. Ry.	370
Texico	C. & E. I. R. R.	506
Thackeray	L. & N. R. R.	505
Thawville	I. C. R. R.	696
Thayer	C. & A. Ry.	648
Thebes	C. & E. I. R. R.	335
Thomasboro	I. C. R. R.	736
Thomasville	I. C. R. R.	657
Thompsonville, top of rail in front of station I. C. R. R.	U. S. G. S.	449.9
Thomson, copper bolt in foundation of Christian Church	C. and G. S.	606.355
Thornton	C. & E. I. R. R.	620
Tice, tablet on schoolhouse	U. S. G. S.	610.511
Tilden	I. C. R. R.	521
Timbuctoo	C. M. & St. P. Ry.	612
Timewell, top of rail in front of station	U. S. G. S.	755.49
Tipton	C. & E. I. R. R.	673
Tiskilwa	C. R. I. & P. Ry.	519
Toledo, top of rail in front of station I. C. R. R.	U. S. G. S.	601.1
Tolono, Wabash and I. C. crossing	I. C. R. R.	736
Toluca	A. T. & S. F. Ry.	702
Tomlinson	I. C. R. R.	733
Tonica	I. C. R. R.	664
Tonti	I. C. R. R.	570
Toronto	I. C. R. R.	592

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Toulon	C. R. I. & P. Ry.	752
Towanda	C. & A. Ry.	787
Tower Hill	C. C. C. & St. L. Ry.	655
Tracy	I. C. R. R.	580
Tremont, iron post at railroad station	U. S. G. S.	643.425
Trenton, tablet on City Hall	U. S. G. S.	497.606
Trilla	T. St. L. & W. R. R.	658
Trimble	C. C. C. & St. L. Ry.	490
Triumph, tablet in concrete walk at northwest corner of First National Bank	U. S. G. S.	670.601
Trivoli	Ia. C. Ry.	748
Trowbridge	T. St. L. & W. R. R.	646
Troy, iron post 100 feet north of railroad station	U. S. G. S.	548.626
Troy Junction, top of rail in front of station	U. S. G. S.	570.1
Tucker	I. C. R. R.	698
Tunnell Hill	C. C. C. & St. L. Ry.	631
Tuscola	I. C. R. R.	653
Twin Grove, top of rail in front of station C. C. C. & St. L. Ry.	U. S. G. S.	817.3
Ulah	C. R. I. & P. Ry.	732
Ullin, B. M. on abutment of bridge No. 15	C. and G. S.	337.545
Ullrich	Van. R. R.	675
Union, McHenry County	C. & N. W. Ry.	836
Union Hill	C. I & S. Ry.	620
Upper Alton	C. B. & Q. Ry.	457
Urbana, iron post near southeast corner of Engineering Hall, University of Illinois	U. S. G. S.	721.103
Ursa	C. B. & Q. Ry.	588
Valier	C. B. & Q. Ry.	440
Valley City	W. R. R.	449
Valmeyer	St. L. I. M. & S. Ry.	406
Vandalia	Van. R. R.	504
Van Orin	C. B. & Q. Ry.	807
Varna	C. & A. Ry.	729
Velma	B. & O. R. R.	610
Venedy, iron post 50 feet south of railroad station	U. S. G. S.	410.508
Venice	C. & A. Ry.	423
Vera	I. C. R. R.	557
Vergennes	I. C. R. R.	393
Vermilion	C. C. C. & St. L. Ry.	674
Vermilion Grove	C. C. C. & St. L. Ry.	672
Vermont	C. B. & Q. Ry.	675
Versailles, iron post 150 feet west of station	U. S. G. S.	587.464
Vevay Park	Van. R. R.	616
Vienna, iron post in Court House yard	U. S. G. S.	404.9

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Villa Grove	C. & E. I. R. R.	650
Villa Ridge, bolt in chimney of Stoddard House	C. and G. S.	385.905
Viola	C. B. & Q. Ry.	797
Virden	C. B. & Q. Ry.	674
Virgil	C. G. W. Ry.	871
Virginia	B. & O. R. R.	593
Voorhies	W. R. R.	683
Wadham	I. C. R. R.	1022
Wadsworth	C. M. & St. P. Ry.	673
Waggoner	I. C. R. R.	646
Walker, Macon County	I. C. R. R.	652
Walker, Will County	E. J. & E. Ry.	613
Walnut	C. B. & Q. Ry.	714
Walnut Grove, top of rail in front of station	U. S. G. S.	717.6
Walnut Prairie	C. C. C. & St. L. Ry.	487
Walsh	I. S. Ry.	482
Walshville	C. & E. I. R. R.	592
Walton	C. B. & Q. Ry.	725
Waltonville	W. C. & W. R. R.	468
Wapella	I. C. R. R.	747
Ware	I. C. R. R.	353
Warnock	St. L. I. M. & S. Ry.	412
Warner	C. B. & Q. Ry.	657
Warren	I. C. R. R.	1005
Warrenhurst, tablet on Daw Brothers house	U. S. G. S.	732.328
Warrensburg	I. C. R. R.	703
Warrenton	C. M. & St. P. Ry.	710
Warsaw	T. P. & W. Ry.	490
Wasco	C. G. W. Ry.	826
Washburn	C. & A. Ry.	695
Washington	A. T. & S. F. Ry.	766
Wataga	C. B. & Q. Ry.	834
Waterloo, iron post at east side of Court House building	U. S. G. S.	717.223
Waterman	C. B. & Q. Ry.	820
Watertown, center of hole in copper bolt 164 feet southeast of C. M. & St. P. Ry. station on brick basement of H. Smith's residence	C. and G. S.	575.382
Watseka	C. & E. I. R. R.	634
Watson	I. C. R. R.	557
Waukegan, tablet on Court House	U. S. G. S.	668.387
Waverly	C. B. & Q. Ry.	674
Wayne, Dupage County	E. J. & E. R. R.	763
Wayne City	So. Ry.	429
Waynesville	Van. R. R.	713
Wedron, iron post near station platform	U. S. G. S.	521.679

Altitudes of towns in Illinois—Continued

Town or city	Authority	Elevation above sea level
		Feet
Weedman	I. C. R. R.	725
Weldon	I. C. R. R.	717
Welga	W. C. & W. R. R.	411
Wellington	C. & E. I. R. R.	698
Wenona	C. & A. Ry.	696
Wesley, top of iron post in Mrs. Elizabeth Walmsley's door yard	Engineer Corps	451.116
West Brooklyn	C. B. & Q. Ry.	948
West Chicago, tablet on city hall	U. S. G. S.	784.078
West End, tablet on rolling mill	U. S. G. S.	430.477
Westervelt	C. & E. I. R. R.	646
Westfield	C. H. & D. Ry.	747
West Frankfort, iron post near railroad station	U. S. G. S.	407.949
West Liberty, top of rail in front of station I. C. R. R.	U. S. G. S.	484.0
West Newell	C. & E. I. R. R.	688
Weston	T. P. & W. Ry.	704
West Point	C. B. & Q. Ry.	667
Westport, tablet on bridge over Embarrass River	U. S. G. S.	437.339
West Ridge	C. & E. I. R. R.	686
West Salem	I. C. R. R.	506
West Vienna, iron post 220 feet west of station	U. S. G. S.	398.812
West York	C. C. C. & St. L. Ry.	467
Wetaug	I. C. R. R.	356
Wheaton, Dupage County, tablet on Court House	U. S. G. S.	752.878
Wheeler	I. C. R. R.	581
Wheeling	W. C. Ry.	650
Whitehall	C. & A. Ry.	578
White Heath	I. C. R. R.	703
Whittington	C. & E. I. R. R.	441
Wichert	C. & E. I. R. R.	637
Wilbern	A. T. & S. F. Ry.	521
Wilderman	I. C. R. R.	503
Willeford, iron post 200 feet west of church	U. S. G. S.	460.216
Willeys	W. R. R.	632
Willisville	M. & O. R. R.	495
Williamsburg	Van. R. R.	694
Williamsfield	A. T. & S. F. Ry.	713
Williamsville, tablet on Prater's Bank	U. S. G. S.	605.649
Wilmette	C. & N. W. Ry.	614
Wilmington	C. & A. Ry.	549
Wilsman	C. B. & Q. Ry.	655
Wilson	C. I. & S. R. R.	615
Winchester	C. B. & Q. Ry.	543

Altitudes of towns in Illinois—Concluded

Town or city	Authority	Elevation above sea level
		Feet
Winfield, tablet on culvert 150 feet east of railroad station	U. S. G. S.	726.667
Wing	W. R. R.	658
Winkel	C. & A. R. R.	525
Winkle	I. C. R. R.	572
Winnebago	C. & N. W. Ry.	861
Winnetka, iron post near old town hall	U. S. G. S.	651.300
Winslow	I. C. R. R.	775
Witt	C. & E. I. R. R.	665
Wolf Lake	I. C. R. R.	357
Womac	C. & A. Ry.	643
Woodbine	C. G. W. Ry.	870
Woodbury	Van. R. R.	587
Wooddale	C. M. & St. P. Ry.	695
Woodhull	C. B. & Q. Ry.	824
Woodland	C. & E. I. R. R.	640
Woodlawn	C. B. & Q. Ry.	495
Woodruff, iron post in front of N. C. Osman's house	U. S. G. S.	840.198
Woods	C. B. & Q. Ry.	482
Woodson	C. & A. Ry.	685
Woodville	C. B. & Q. Ry.	664
Woosung	I. C. R. R.	816
Wordon	C. & E. I. R. R.	586
Worth	W. R. R.	608
Wrights	C. B. & Q. Ry.	587
Wyanet	C. B. & Q. Ry.	656
Wyckles	W. R. R.	668
Wyoming	C. B. & Q. Ry.	711
Xenia	B. & O. R. R.	540
Yale	C. H. & D. Ry.	559
Yeomans	C. & A. Ry.	698
Yorkville	C. B. & Q. Ry.	584
Youngsdale	I. C. R. R.	799
Youngstown, 100 feet north of station	U. S. G. S.	751.578
Zearing	C. B. & Q. Ry.	761
Zeigler	I. C. R. R.	427

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